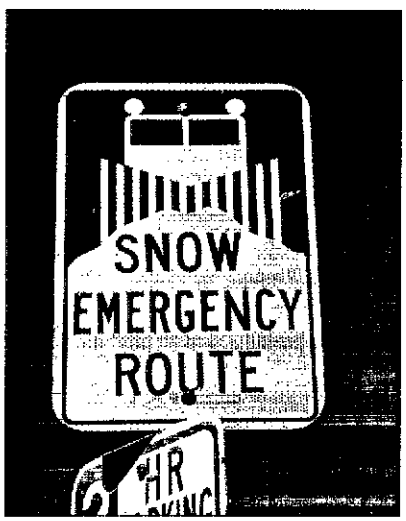
Minneapolis
City of Lakes

Snow Emergency Analysis Project

Final Report



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Finance Department

2002

Snow Emergency Analysis Project
Executive Summary

This report summarizes the analysis of the snow emergency (SE) activities and costs for the current 3 Phase SE plan and an alternative 2 Phase (24-Hour) SE plan. It presents best practices research on snow emergency operations and summarizes comments and concerns regarding snow emergency operations from elected officials, citizens, and City management and staff.

This report presents estimates of additional staff, materials, and equipment for an alternative 2 Phase plan and these estimates may change as operational details are determined based on availability of staff, materials, equipment, and funding, or based on variations of the preliminary 2 Phase plan used to create the estimates.

Summary Comparison of the Current 3 Phase Plan and an Alternative 2 Phase Plan

The current 3 Phase SE plan utilizes over 360 staff from six divisions and is conducted over a 47 hour time period. The activities of the plan are shown in Figure E-1. The plan has a cost of $243,000 per snow emergency. It plows all travel lanes and two-thirds of the parking lanes in the first two phases (23 hours). It uses a Parking Change-over period (12 hours) to allow citizens to move their vehicles to a non-restricted parking lane, and then a third phase (12 hours) is conducted to plow the remaining one-third of the parking lanes.

An alternative 2 Phase SE plan would utilize approximately 420 staff and would be conducted during a 24 hour time period. The activities of the plan are shown in Figure E-2. It would include assigning approximately 30 additional staff for plowing and 25 additional off-duty police officers for enforcement tagging. It would also include adding 25 pieces of plowing equipment possibly by retrofitting 25 solid waste packers for plowing, adding up to 112 tow trucks to continue towing at the existing rate, installing new signage, and generating 10% fewer tags. The one-time start-up costs would include $300,000 to $1.4 million for signage, and $400,000 for retrofitting equipment. The 2 Phase plan has a cost of $226,000 per snow emergency. It would plow approximately 50% of the travel lanes and parking lanes during a Night Phase (12 hours), and the remaining 50% of travel lanes and parking lanes during a Day Phase (12 hours).

With each plan, the declaration of a snow emergency initiates a set of parking restrictions intended to move vehicles from parking lanes to allow the City to conduct full street-width plowing. The parking restrictions for the 3 Phase plan and a 2 Phase plan are as follows:

Current 3 Phase Plan		Alternative 2 Phase Plan	
Phase 1	9 p.m. to 8 a.m. SE routes	**Night Routes**	9 p.m. to 8 a.m. major arterials and some residential
Phase 2	8 a.m. to 8 p.m. One side of non-SE routes and both sides of parkways	**Day Routes**	8 a.m. to 8 p.m. all non-night routes
Parking Change-over	8 p.m. to 8 a.m. no restrictions		
Phase 3	8 a.m. to 8 p.m. Remaining side of non-SE routes		

Some of the most significant issues affecting snow emergency operations are the number of vehicles located in the City and the amount of on-street and off-street parking availability, the number of vehicles violating parking restrictions, the capacity of enforcement tagging and enforcement towing, the ability to impose a one-sided parking ban, and the ability to communicate the plan.

Extensive analysis was conducted on the number of vehicles within the city, availability of on-street and off-street parking, the compliance with parking restrictions, and the capacity of enforcement tagging and enforcement towing. The results of that analysis were used in the comparison of the current 3 Phase plan and the alternative 2 Phase plan.

The ability to communicate a consistent, uniform message can affect the compliance with parking restrictions of a plan. It is anticipated that a 2 Phase plan may be a simpler message to communicate than the current 3 Phase plan, and therefore may increase compliance with the parking restrictions.

Additional issues affecting snow emergency operations include the number of lane miles to be plowed and time allowed for completion, availability of plowing staff and plowing equipment, one-time start-up costs, and on-going costs. A summary of these issues affecting the activities and costs of each plan are shown in Figure E-3.

A significant number of activities would need to occur prior to transition from a 3 Phase plan to a 2 Phase plan. A preliminary transition schedule is shown in Figure E-4.

A summary of the pros and cons of each plan are shown in Figure E-5.

Figure E-1
Activities of City Departments/ Divisions During a 3 Phase Snow Emergency

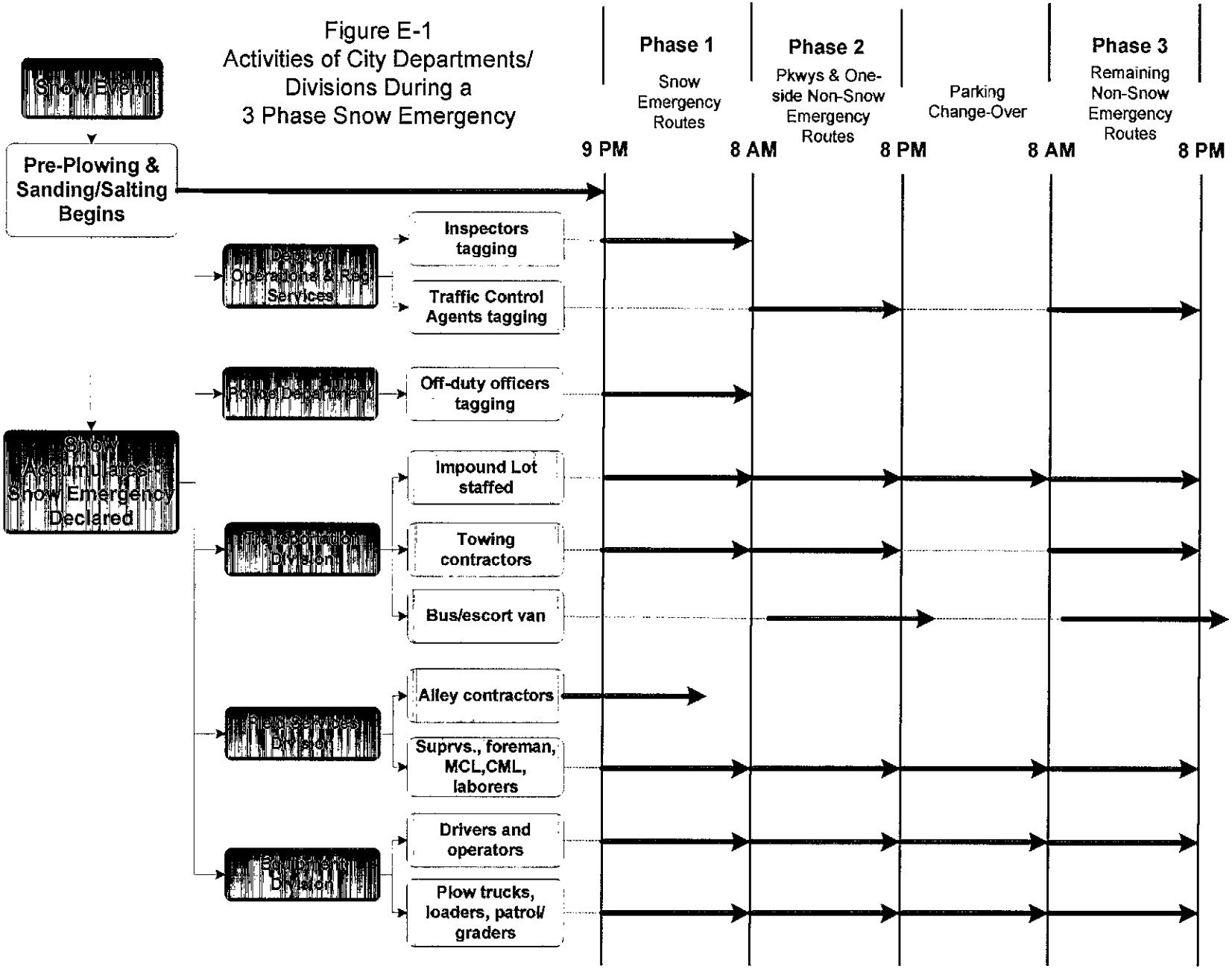

Figure E-2
Activities of City Departments/
Divisions During a
2 Phase Snow Emergency

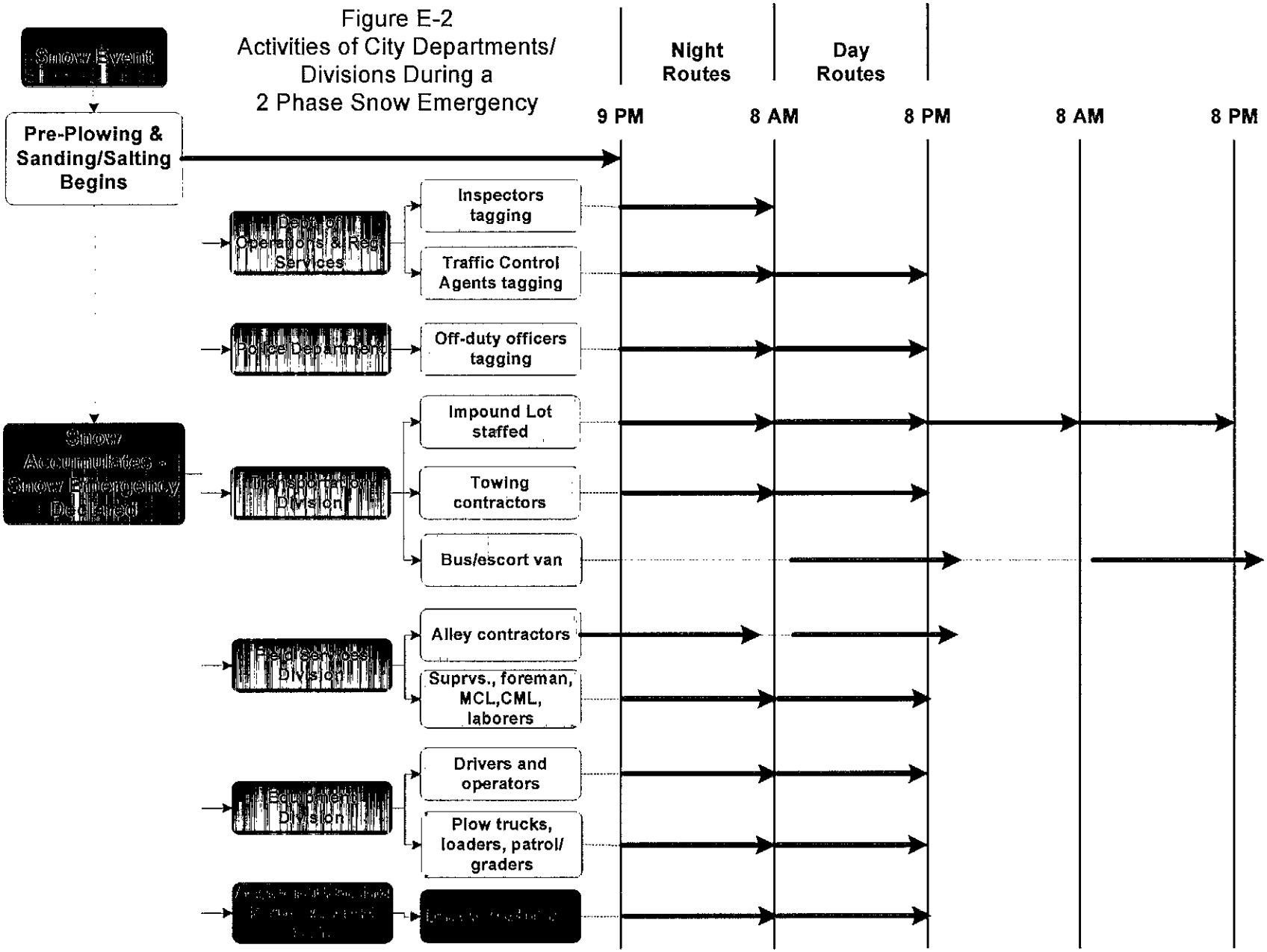

Figure E-3

Activity and Costs	Current 3 Phase Plan	Alternative 2 Phase Plan
Schedule		
Phase 1 (Night Routes)	9 pm to 8 am	9 pm to 9 am
Phase 2 (Day Routes)	8 am to 8 pm	9 am to 9 pm
Change-over	8 pm to 8 am	
Phase 3	8 am to 8 pm	
Lane Miles		
Phase 1 (Night Routes)	743	1,497
Phase 2 (Day Routes)	952	1,040
Phase 3	842	
Parking Availability	1/3 restricted each phase	1/2 restricted each phase
Number of staff		
Plowing activities	246	276
Enforcement-tagging	86	111
Impound lot	31	31
Plowing equipment	60-80	85-105
Enforcement-towing	67 trucks	67-179 trucks
Number of tags		
Phase 1 (Night Routes)	2,421	4,483
Phase 2 (Day Routes)	4,320	4,105
Phase 3	2,848	
Total	9,589	8,588
Tag Revenue (net)	$130,000	$117,000
Number of tows		
Phase 1 (Night Routes)	592	592 – 1,434
Phase 2 (Day Routes)	515	515 – 740
Phase 3	557	
Total	1,664	1,107 – 2,174
Tow Revenue (net)	$131,000	$87,000 - $172,000
On-going base costs	$303,000 (3 days)	$251,000 (2 days)
On-going incremental costs	$243,000/snow emergency	$226,000/snow emergency
One-time costs		
Signage	N/A	$300,000 - $1.4 million
Retrofit packers	N/A	$429,000
Use of One-Side-Parking Ban	Yes	No

Figure E-4
Preliminary Transition Schedule for a 2 Phase Plan

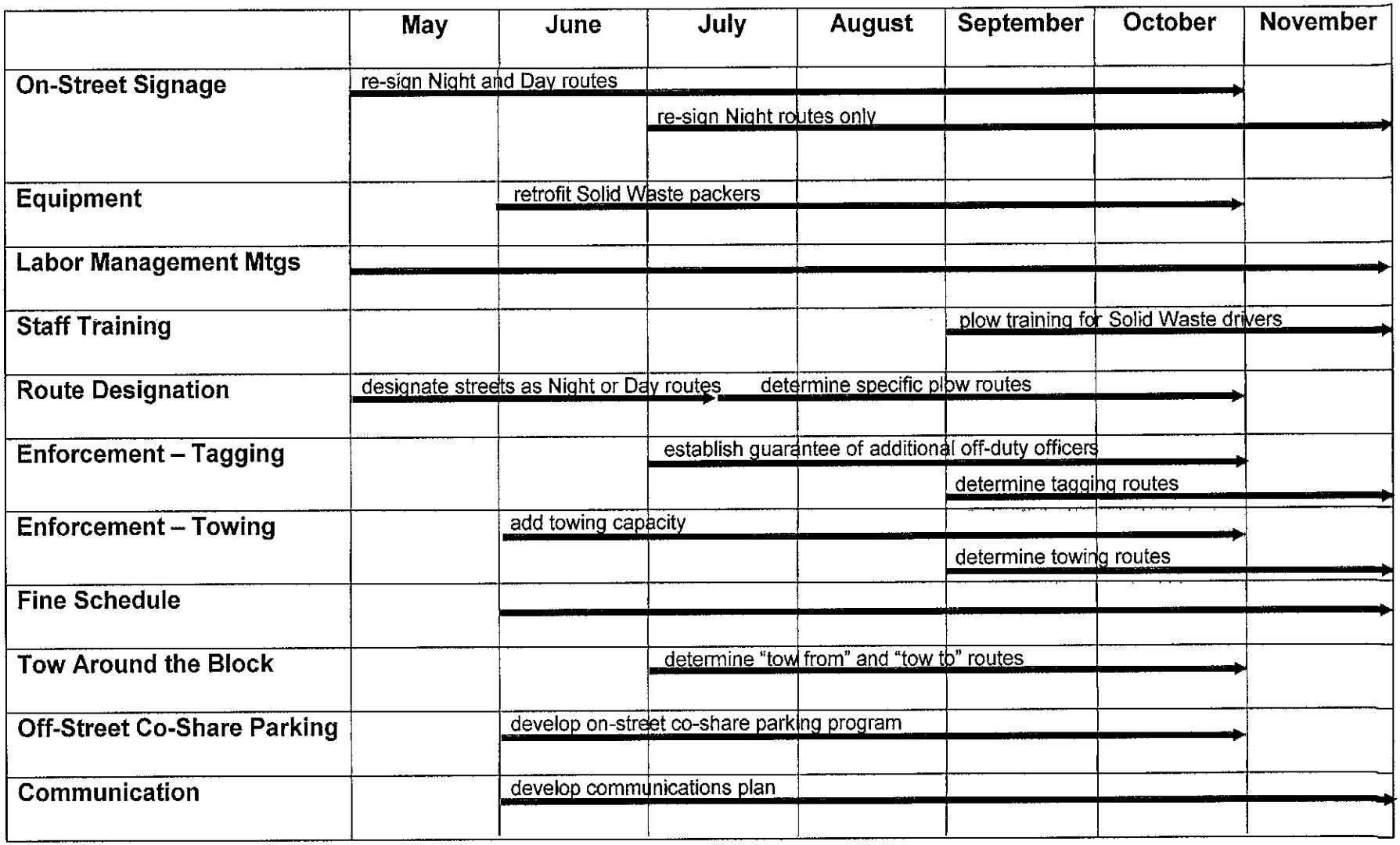

Figure E-5
Summary of Pros and Cons

Current 3 Phase Plan:

Pros

- All streets and 2/3 of parking lanes are plowed in first 2 Phases
- Parking Change-over allows citizens to move their vehicles prior to 3rd phase
- Only 1/3 of parking is prohibited during each phase
- Full 12-hour parking restriction on a street allows time for enforcement, plowing, and follow-up plowing if necessary to clean-up for pull-ins/pull-outs
- enforcement tagging and towing stay ahead of the plowing
- Odd-even allows parking on one side of all non-SE streets at all times
- Odd-even allows easy implementation of one-sided parking ban if required
- Time allowed for plowing ensures meeting good quality service levels

Cons

- Complex message is difficult to communicate and affects compliance
- Long time period to complete plan from start to finish
- Difficult to re-start the plan if another snow event occurs during the plan
- Constantly scrutinized against City of St. Paul 24-hour plan
- Terminology is not standardized – referred to as Days, Phases, Night, Day

Alternative 2 Phase Plan:

Pros

- All streets and parking lanes plowed in 24 hours
- Number of lane miles plowed in first 12 hours is nearly doubled
- Simpler system to communicate which may improve compliance
- Plan would be similar to the St. Paul plan so media message would be clearer
- Easier to re-start or conduct back-to-back if another snow event occurs
- parking is allowed after a street is plowed
- On-going incremental cost is $17,000 less than current 3 phase plan

Cons

- 50% of parking is restricted during each phase until street is completed
- plows only get one opportunity to plow each street, as citizens will begin to park immediately after a plow passes
- No clean-up for pull-ins/pull-outs can be completed because parking is allowed once plows go down the street once
- No enforcement can occur once a plow goes down a street
- Quality of the plowing may decrease because of reduced time allowed to plow
- Requires additional plowing staff, plowing equipment, tagging staff, and towing that may not be available
- More follow-up plowbacks with temporary posting of "no parking" signs may be required
- Utilizing Solid Waste staff and equipment may delay solid waste collection

- Increased tows may exceed capacity of Impound Lot
- Towing capacity may be limited by availability of private sector tow trucks
- One-time start-up costs for signage of $300,000 to $1.4 million
- One-time start-up costs for retrofitting packers of $400,000
- Shorter time-frame compresses sequence of tags, tows, plows
- Lessens the ability to use one-sided parking ban as plowing not based on odd/even system

Summary of Public Officials and Citizens Comments

The concerns and comments of elected officials and citizens regarding the current 3 Phase SE Plan and a 2 Phase SE Plan were acquired through a series of interviews, Neighborhood Information Meetings, letters, emails, phone calls, comment cards, and the Minneapolis Citizen Survey.

While there were comments that we could do plowing faster, there were many comments that the current system is appropriate. The most often repeated comments that elected officials have heard from constituents are:

- Alley plowing should be improved
- Windrows at intersections are a problem
- Snow plowed into driveways is a problem
- We need to tow more – violating vehicles are a problem and they generate many complaints.

The Neighborhood Information Meetings and other citizen input generated many comments, however, there was no consensus that a 2 Phase plan would be preferred over the current 3 Phase plan. Additional concerns about alleys, signage, windrows, towing, and communication of the plan were stated.

The Minneapolis Citizen Survey identified the following top 3 preferred sources for receiving SE information for the following percentage of respondents:

- 90% - radio
- 73% - signage
- 66% - 348-SNOW

When asked how the City could help them comply with SE parking restrictions, 40% of respondents to the Citizen Survey stated they do not drive, didn't think it was a problem, or weren't able to make a suggestion. Almost 25% of respondents stated improved notification would help them comply, and 21% stated signage improvements would help them comply. Almost 15% said SE parking restrictions are not a problem, and 0% stated faster plowing would help them comply.

The Manager of Street Operations for the Metro Transit Board and the Director of Transportation Services of the Minneapolis Public Schools each indicated satisfaction with the current 3 Phase SE plan.

Summary of Best Practices Research

A survey of the SE operations of 30 larger and regionally adjacent snow cities identified that there is a wide range of approaches to parking restrictions and plowing during snow events. A number of features used by cities include:

- Total parking ban on all streets until plowing is complete
- Seasonal one-sided parking bans
- Parking restrictions for selected areas of a city
- Year-round parking bans
- Using communication techniques such as loudspeakers informing citizens of a tagging and towing, door knocking, paid media ads, and flyers on windshields

The length of SE's varied from 8 hours (Edina-which uses a total parking ban), to 72 hours (St. Cloud and Toronto), to 5 days (Winnipeg). Of the 19 cities that responded to the full survey, Minneapolis had the highest number of towed vehicles per SE. A number of cities use a seasonal or year-round one-side parking ban to facilitate SE operations.

Two unique operational features are used by some of the cities to facilitate SE operations:

1) **tow around the block or mini-tow** – towing violating vehicles to the nearest plowed street rather than to an impound lot. Used extensively by Buffalo, and by Denver, Edmonton, Rochester NY, Toronto, and Winnipeg.

2) **co-share off-street parking lots** – using off-street parking lots such as church or school lots for the parking of citizen's vehicles during SE's. Used extensively by Milwaukee and Buffalo.

Summary of Analysis of Parking, Tagging and Towing

The availability of on-street and off-street parking is essential to maintaining a high level of service during SE operations. A vehicle and parking analysis identified a high density of vehicles per block in the neighborhoods immediately east of Lake Calhoun and Lake of the Isles, and into the Loring Park and Steven Square area. Powderhorn Park, Marcy-Holmes, and Cedar-Riverside also have a high density of vehicles. When the amount of available on-street and off-street parking are combined with the total number of vehicles, these areas have a significant shortage of parking during SE's parking restrictions.

An analysis of the compliance with parking restrictions during SE's identified that of the 207,000 vehicles owned by Minneapolis households, more than 95% of those vehicles comply with SE parking restrictions; less than 5% receive violations; and less than 1% are towed to the Impound Lot.

Additional Operational Features That Could be Utilized in the Current 3 Phase plan, or an Alternative 2 Phase plan

As a result of the Best Practices research and discussions with City management and staff, the following five additional operational features were identified as features that could possibly be utilized with either the current 3 Phase SE plan or the 2 Phase SE plan. Each of these additional operational features would require further research and analysis to determine specific operational and cost issues and ultimate viability.

- **Increased SE parking violation fines** - The current SE parking violation fine is $20. The typical parking violation fine is $30. The Manager of the Hennepin County Violations Bureau has stated that the two fines cause tremendous confusion among citizens. The Manager has suggested that the SE fine be set at $30 as a matter of consistency. It has been suggested that the fine be increased to between $50 and $75 to attempt to increase the compliance with SE parking restrictions. A $75 fine would generate an additional $359,000 in parking violation revenue in the current 3 Phase plan, and $308,000 in a 24-hour plan.

  Pros:
  - encourage owners to move their vehicles that may violate parking restrictions
  - a $30 fine would standardize SE parking violation with typical parking violations

  Cons:
  - may have most impact on citizen's that can least afford an increase

- **Tow around the block** – This operational feature involves towing violating vehicles to the nearest plowed street rather than to the Impound Lot. It allows moving up to 63 violating vehicles per tow truck in a 12 hour SE phase, compared to the current tow rate of 9 vehicles per tow truck in a 12 hour SE phase. There are some significant operational pros and cons for this feature such as:

  Pros:
  - move more violating vehicles by avoiding long turn-around time for tow trucks
  - Allows citizens to avoid trip to Impound Lot to recover a violating vehicle
  - Avoids using space at Impound Lot
  - Can tow scofflaw vehicles to Impound Lot

  Cons:
  - More administrative work to track moved vehicles and make information available to citizens
  - May encourage citizens to avoid moving vehicles and instead allow City to tow it around the block
  - Citizens need to find their moved vehicle
  - Potential liability once City moves vehicle
  - In first few hours there are few plowed streets to move vehicles to

- **Co-share off-street parking lots** – This parking program utilizes existing off-street parking such as church parking lots in areas where the number of

vehicles exceeds the availability of on-street and off-street parking. There are some significant operational pros and cons for this feature such as:

Pros:

- Increases availability of off-street parking
- Allows citizens to avoid violating parking restrictions
- May encourage less desirable parking lots to become "neighborhood friendly" lots

Cons:

- Requires that these lots are plowed first
- Potential liability when plowing lots
- Potential liability for vehicles that may be damaged in the lot, or abandoned in the lot; and requires a management program
- May not meet approval with neighboring property owners
- Potential conflicts with other uses of the lots

- **Additional alley plowing** – This involves plowing the alleys at the completion of the SE as well as at the beginning of the SE. This removes windrows at the end of alleys and removes snow that may be shoveled into the previously plowed alleys. The cost of additional alley plowing is approximately $40,000 per snow emergency. Better alley plowing was one of the top concerns raised by Council Members and citizens during the Neighborhood Informational Meetings.

- **Communications** – This involves utilizing additional methods for communicating SE information such as; email notification to universities, employers, multi-unit housing, hospitals, churches, ethnic organizations, and neighborhood organizations; utilizing block club leaders to inform citizens through phone messaging or door knocking; and re-phrasing of the message to be more effective.

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Snow Emergency Analysis Project
Final Report

Introduction

This project was initiated by the Director of Public Works in October 2001 in response to renewed interest in an alternative 24-hour snow emergency plan.

The project reviewed the costs and operational issues of the current City of Minneapolis snow emergency plan; reviewed the City of St. Paul plan; conducted a survey of snow emergency procedures used by other northern snow-belt municipalities; analyzed features such as "tow around the block" and "co-sharing off-street parking"; and developed an alternative 2 Phase plan. It included citizen participation from the City-wide Citizen's Survey, Neighborhood Information meetings, and interviews with Council Members to identify their constituents issues and their expectations for future level of service. It also received comments from City of Minneapolis management and staff.

Scope of Project

While snow and ice control occurs throughout the entire snow season, this project focused on activities occurring as a result of an officially declared snow emergency.

The project analyzed key issues related to snow emergencies such as:

Costs	Parking restrictions
Staffing	Towing and impounding
Equipment	Transition
Routes	Service levels
Schedules	Enforcement
Signage	Communication

As every snow event varies and the snow emergency response may vary slightly in terms of amount of staff, equipment and materials, this project estimated activities and costs for an "average" snow emergency. The abbreviation "SE" will be used for "snow emergency" throughout this report.

This report is structured to provide:

- Description of the current SE activities – Page 5
- Detailed analysis of parking and enforcement issues – Page 21
- Comments from public officials and citizens – Page 26
- "Best Practices" research from other cities – Page 39
- 2 Phase alternative plan – Page 52

Snow Emergency Design Team

A multi-departmental Snow Emergency Design Team conducted a number of meetings to assist in analysis and development of alternative plans and features. The Design Team included:

David Sonnenberg –	Director, Public Works
Brian Lokkesmoe –	Deputy Director, Public Works
Mike Kennedy –	Field Services Division
Steve Collin –	Field Services Division
Greg Kolinski –	Field Services Division
Carol Morgan –	Field Services Division
Robert Pletan –	Equipment Division
David Babcock –	Equipment Division
Bill Gauthier –	Equipment Division
Scott Wellan –	Transportation Division
Dennis Bechard –	Transportation Division
John Hotvet –	Transportation Division
Donald Pedlar –	Transportation Division
John Mclain –	Administration Services
Pierre Willette –	Administration Services
Pamela Selinski –	Traffic Control Division
Patti Ellard –	Traffic Control Division
Duane Haponuk –	Traffic Control Division
David Rumpza –	Police Department
Sara Dietrich –	Public Affairs Department
Bill Carter –	Public Affairs Department
Laura Sether –	Mayor's Office
Tim David –	Management Analysis Division
Laura Lambert –	Management Analysis Division
Jeff Schneider –	Management Analysis Division

List of Abbreviations Used Throughout the Report

"SE" - Snow Emergency
"PW" - Public Works
"DORS" - Department of Operations and Regulatory Services
"TCA" - Traffic Control Authority

History of Snow Emergency Plans in Minneapolis

Prior to 1983	Streets were plowed in north-south, east-west system. (Minneapolis and St. Paul used the same system)
1980-1983	Large snowfalls resulted in large windrows along sides of streets creating narrowed streets. Snow season one-sided parking bans were implemented to maintain street width for public safety purposes.
1983	The present 3 Phase odd-even system of plowing was adopted. This system and the use of a snow season one-sided parking ban allowed two-thirds of the streets to be easily plowed. The decrease in available on-street parking was a concern to the citizens.
Late 1980's	Light snowfall during these years resulted in a repeal of the snow season one-sided parking ban as citizens were unwilling to lose on-street parking when it appeared unnecessary.
1990	St. Paul adopts a 24-hour plan which includes Night Plow Routes of major arterials and one side of north-south streets; and Day Plow Routes of all east-west streets and remaining north-south streets. Signage is placed on all Night Plow Routes.
1996	Minneapolis Public Works Department proposes a 24-hour snow emergency plan which included: • Night Plow Routes of arterials and some non-arterial streets – plowed 7 PM to 8 AM • Day Plow Routes of all remaining non-arterial streets – plowed 8 AM to 7 PM • Signage to be installed on all streets at a cost of $1.3 million • communication and enforcement to be increased • 20 additional pieces of equipment to be added or modified • a cross-trained, ready labor force to be developed • corners, bus stops, and downtown to receive enhanced clearing • teams to be created to develop transition plans The proposed 24-hour plan was not approved.

Description of St. Paul Snow Emergency Plan

St. Paul adopted a snow emergency plan in 1990 that consists of Night plowing and Day plowing. The parking restrictions for this plan begin at 9 p.m. and continue until 5 p.m. the next day for a total of 20 hours. Plowing occurs before the restrictions begin and continues after the restrictions are over. Vehicles are allowed to park on-street once the street is "fully plowed". A snow emergency is declared after a snowfall accumulation of 3".

Night plowing - begins at 9 p.m. and continues until 6 a.m. The routes plowed are major arterials and one-side of the north-south residential streets. All of these routes are signed with a "Night Plow Route" or "Night Plow Route This Side of Street" sign.

Day plowing - begins at 8 a.m. and continues until 5 p.m. The routes plowed are east-west residential streets and the side of the north-south streets that are not signed as Night Plow Routes. The Day routes do not have any snow emergency signage.

St. Paul utilizes 80 snow-plowing vehicles operated by 80 staff that are a combination of drivers, operators, laborers, and service workers which are cross-trained staff. The shift pattern during a snow emergency is shift 1 – 9:00 p.m. to 7:30 a.m. and shift 2 – 7:30 a.m. to 5:00 p.m.

A total of 76 staff are used for parking restrictions enforcement. These staff are comprised of 50% contracted employees from security firms, and 50% Public Works employees, temporary employees, and some Police Department employees that are not police officers. A total of 2500 to 5000 tags are written for each snow emergency. Violation of the snow emergency parking restrictions is a $40 fine. Approximately 1200-1400 vehicles are towed each snow emergency. The impound release fee is $128.40.

There are 2700 alleys in St. Paul and the City of St. Paul does not plow these alleys. Some residents hire private contractors to plow alleys, otherwise, alleys are not plowed. The City does not provide enhanced snow clearing at bus stops or corners. Some downtown snow removal is done.

Approximately 900 center-lane miles are plowed. Their estimated cost for each snow emergency is $300,000. The City of St. Paul plows all County roads, and some State Trunk Highways.

The City of St. Paul Street Maintenance Engineer that manages the plowing operations stated his three keys to an ideal 24 Hour plan would be: 1.) re-structuring of routes, 2.) use of signage (St. Paul only signs Night Routes), and 3.) a one-sided parking ban to allow quicker plowing (St. Paul's plan is not structured to allow the use of a one-sided parking ban).

Description of the Current City of Minneapolis 3 Phase Snow Emergency Plan

Authority to Declare a Snow Emergency

The authority to declare a snow emergency is given to the City Engineer and the Chief of Police as stated in City Ordinances. The declaration of a snow emergency initiates a series of parking restrictions intended to remove vehicles from the parking lanes and allow for curb-to-curb plowing.

The decision to declare a snow emergency is affected by a combination of factors including the timing, intensity, and duration, of a snow event, and the time of year and prior accumulations. The decision is made after consultation with operational staff and other public safety officials. The preference is to make the declaration of a snow emergency by mid-afternoon to allow citizen's time to receive notification of the parking restrictions and move their vehicles prior to the start of the restrictions that begin at 9 p.m.

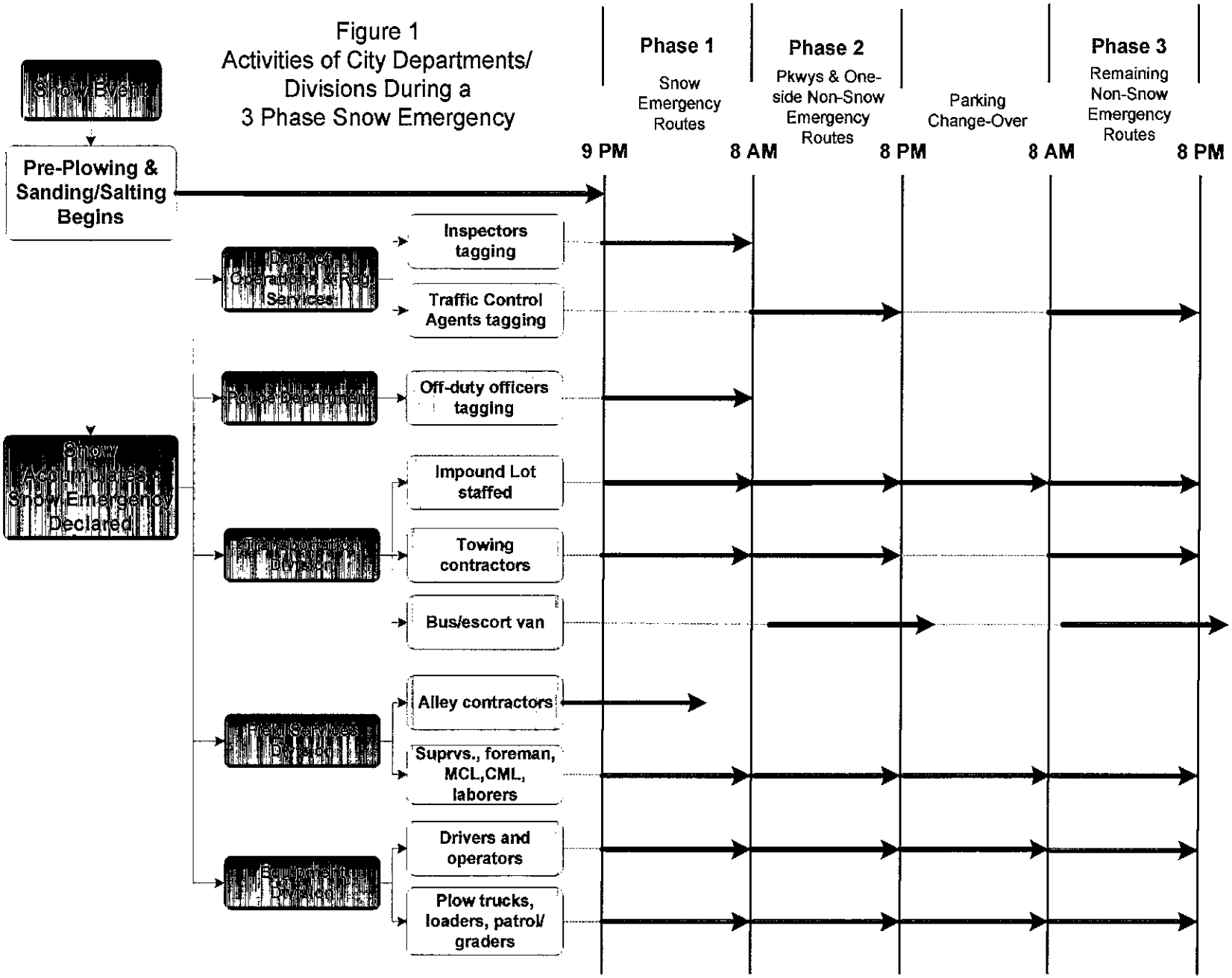
City Departments and Divisions Conducting Snow Emergency Operations

The City Departments and Divisions involved in activities during a specific snow emergency activities are as follows:

Field Services Division – Public Works	provides overall management of SE operations, and provides supervisors, foreman, crew leaders, laborers, and support staff.
Equipment Division – Public Works	provides equipment, operators, drivers and dispatchers to assist in plowing operations
Transportation Division – Public Works	provides supervisors and staff to operate the Impound Lot and manages the towing contractors
Traffic Control Authority – Dept. of Operations and Regulatory Services	provides supervisors, traffic control agents, and manages inspectors conducting enforcement tagging
Police Department –	provides off-duty police officers for enforcement tagging
Public Affairs Office – City Coordinators Office	coordinates the production and distribution of communications such as press releases, brochures, city calendar inserts

A summary of general activities conducted by each division over the current 3 Phase snow emergency plan is shown in Figure 1.

Figure 1
Activities of City Departments/
Divisions During a
3 Phase Snow Emergency



Miles of Streets Plowed

A total of 2,856 lane miles exist within the City of Minneapolis (one lane mile equals a twelve foot wide street one mile long). During a snow emergency the City is responsible for plowing 2,537 lane miles which includes County-State-Aid Highway (CSAH), Municipal-State Aide (MSA), and State Truck Highway (STH), Parkways, and residential streets as follows:

Phase 1	**Phase 2**	**Phase 3**
15 CSAH	110 Park & Rec Bd	842 residential
80 STH	842 residential	842 total lane miles
648 MSA	952 total lane miles	
743 total lane miles		

The remaining 315 lane miles of CSAH are plowed by Hennepin County, and 4 lane miles of University of Minnesota streets are plowed by the University of Minnesota.

The City also plows over 3,700 alleys (about 400 lane miles), 100 cul-de-sacs, 250 bridge sidewalks, and 7 pedestrian bridges.

Parking Restrictions Schedule and Plowing Schedule

Parking restrictions are in-place for 35 hours during the current 3 Phase snow emergency which occurs over a 47 hour time period. "Pre-plowing" is done on the center lanes of major arterials and on the driving lanes of residential streets and parkways to keep traffic moving prior to the start of the parking restrictions. Full street-width plowing occurs on a street during the time that the parking restrictions are imposed on that street. "Maintenance plowing" continues after the parking restrictions have expired.

The Phase 1 parking restrictions apply to both sides of snow emergency routes, and Phase 2 and Phase 3 parking restrictions apply to the odd or even side of non-snow emergency routes.

Phase 1 parking restrictions and plowing - begin at 9:00 p.m. and continue until 8:00 a.m. The routes plowed during this phase are both sides of the "Snow Emergency Routes". These routes are major arterials that generally have a high average daily traffic (ADT), are Metro Transit bus routes, or are streets that are used to minimize the distance citizens need to travel to reach a plowed street where a major arterial or bus route does not exist. A map indicating the snow emergency routes is shown in Figure 2. snow emergency routes are set in City Ordinances and are based on recommendations made by the Transportation Division.

Phase 2 parking restrictions and plowing- begin at 8:00 a.m. and continue until 8 p.m. and include both sides of Parkways and one side of non-snow emergency routes.

The side to be plowed on Phase 2, odd or even, is alternated each year to match the odd or even year in which the snow season started. The snow season of 2001-2002 started in an odd year, therefore the odd side is plowed on Phase 2 during the 2001-2002 season.

Parking change-over - begins at 8 p.m. and continues until 8 a.m. This change-over allows citizens to move their vehicles from the side of non-snow emergency routes that will be plowed in Phase 3. No enforcement of parking restrictions by tagging or towing occurs during this change-over.

Phase 3 parking restrictions and plowing - begin at 8 a.m. and continue until 8 p.m. and include the side of the non-snow emergency routes that were not plowed on Phase 2.

The map shown in Figure 3 identifies how the odd and even side of the street varies throughout the City. The map also identifies how the alignment of the streets varies from an obvious north-south alignment in some areas, to a northeast-southwest alignment, and a less obvious compass alignment in other areas. It also shows how the designation of "street" and "avenue" varies between the northern half of the City and the southern half of the City. These complexities in the roadway system contribute to the difficulty of communicating and complying with a snow emergency plan based on odd-even, north-south and east-west, or street-avenue parking restrictions.

One-Sided Parking Bans

Winter season one-sided parking bans are allowed by City ordinance and are used when snow accumulations become so great that access for emergency vehicles and public safety is jeopardized. The one-sided parking ban can be applied to one side of non-snow emergency routes. In winter seasons beginning in odd-numbered years vehicle parking can be prohibited on the side of the street with odd-numbered addresses and in winter seasons beginning in even-numbered years vehicle parking can be prohibited on the side of the street with even-numbered addresses.

Once imposed, this one-sided parking ban can remain in effect for the remianing portion of the winter season, or may be removed at the discretion of the City Engineer and the Chief of Police.

One-sided parking bans are utilized approximately once per snow season. It restricts parking on approximately one-third of the City streets.

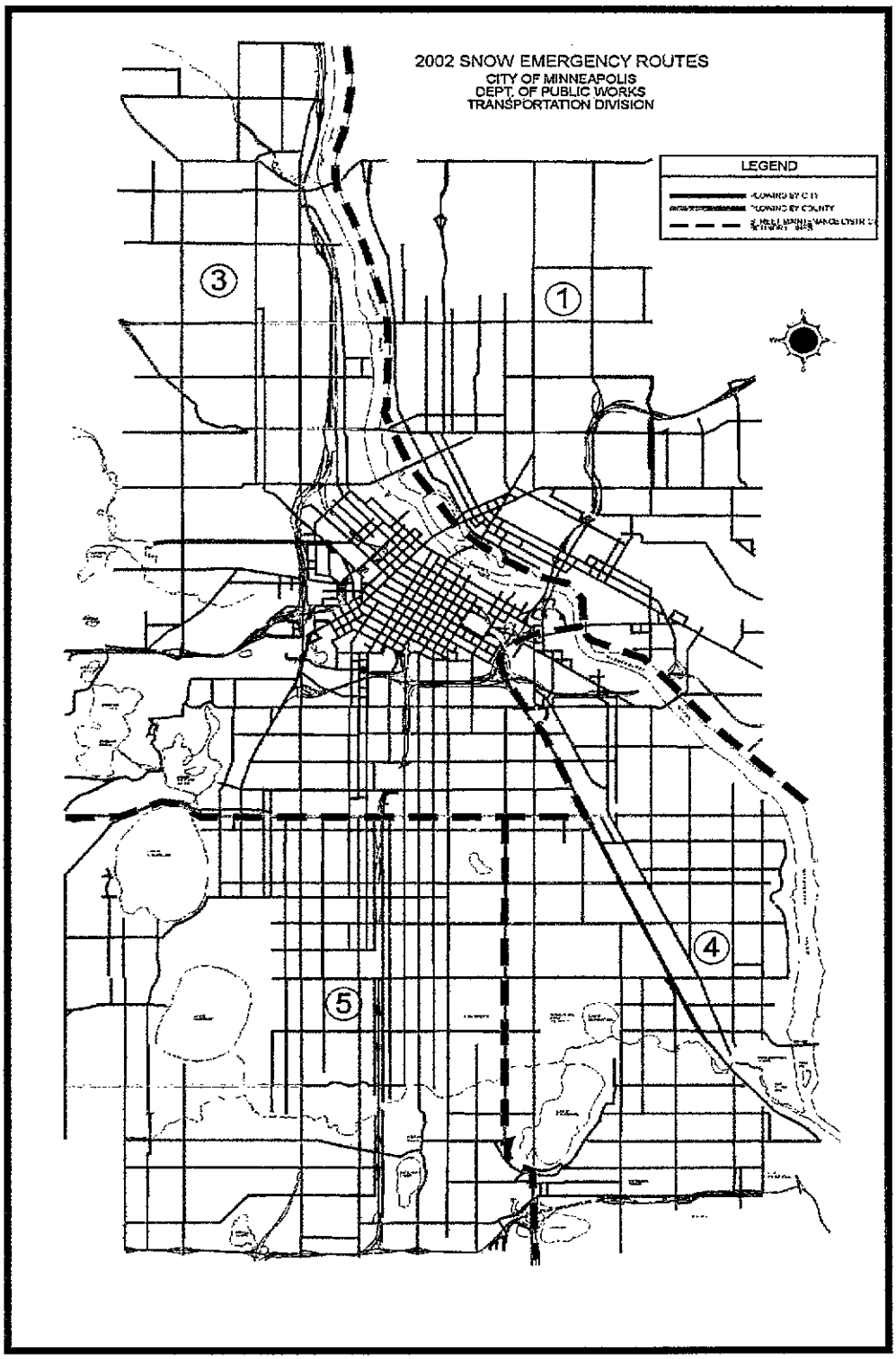
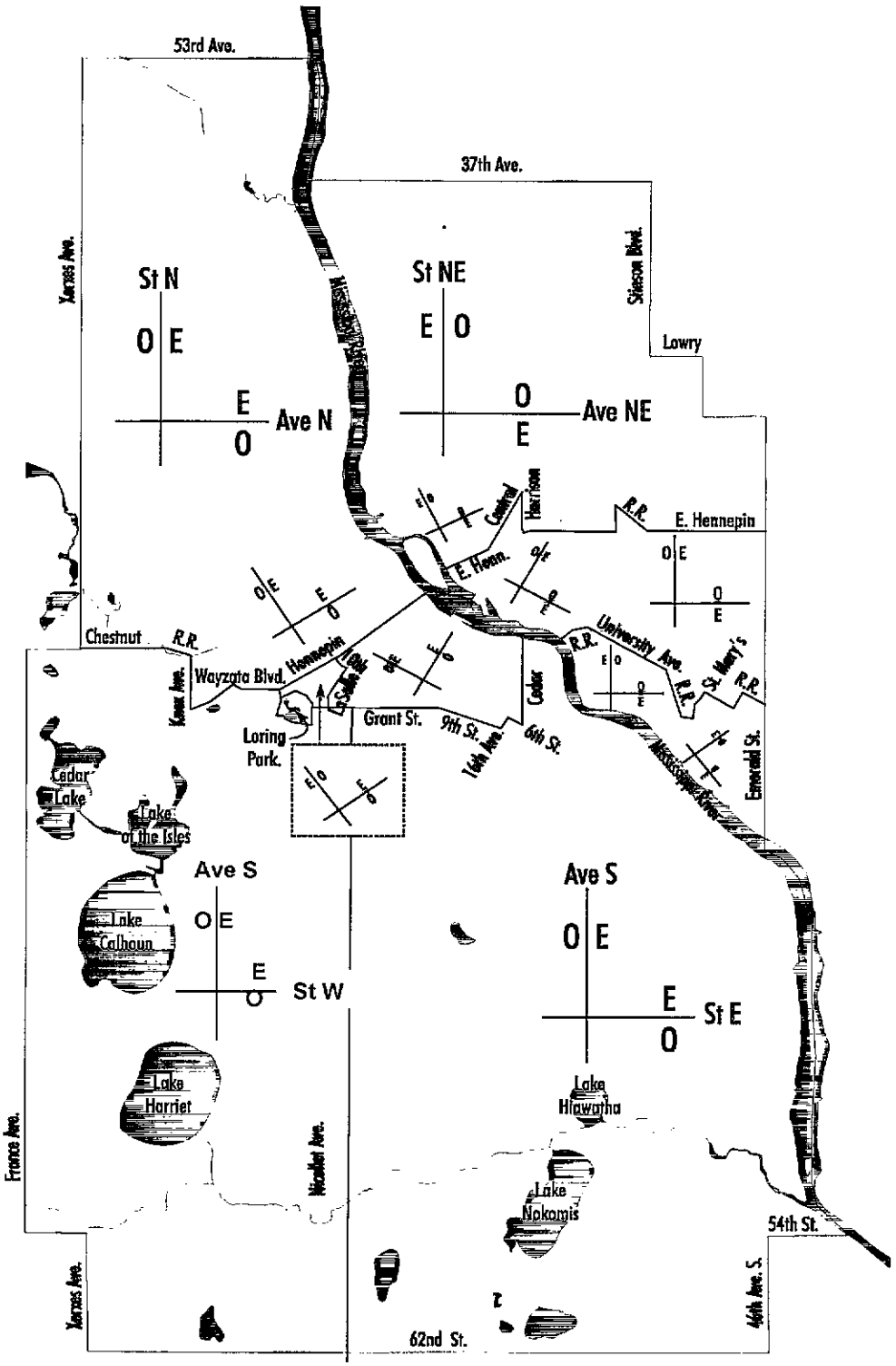

2002 SNOW EMERGENCY ROUTES
CITY OF MINNEAPOLIS
DEPT. OF PUBLIC WORKS
TRANSPORTATION DIVISION
LEGEND
3
1
4
5

FIGURE 3
Odd-Even, North-South, Street-Avenue Alignment



Costs of an Average 3 Phase Snow Emergency

The estimated cost for all activities during a snow emergency is $546,500. This includes a base cost for labor and materials of $303,300 that would be expended for snow and ice control during a 3 day period without a snow emergency being declared, and includes additional incremental costs for labor, equipment and materials (such as overtime, and equipment contracts) of $243,200 expended as the direct result of a snow emergency being declared. A summary of the costs is shown below.

	Hours	Labor Expenses ($)	Equipment/ Material Expenses ($)	Total Base Costs ($)	Total Incremental Costs ($)	Total Costs ($)
Regulatory Services						
Base	0	0	0	0		
Incremental	1,225	44,000	2,100		46,100	
Total	1,225	44,000	2,100			46,100
Police						
Base	NA	0	0	0		
Incremental	NA	7,700	800		8,500	
Total	NA	7,700	800			8,500
Transportation						
Base	417	9,100	0	9,100		
Incremental	288	10,900	40,000		50,900	
Total	705	20,000	40,000			60,000
Field Services						
Base	1,632	46,000	114,700	160,700		
Incremental	816	40,000	0		40,000	
Total	2,448	86,000	114,700			200,700
Equipment Services						
Base	2,272	97,500	36,000	133,500		
Incremental	1,184	88,000	9,700		97,700	
Total	3,456	185,500	45,700			231,200

Total Base Costs $303,300

Total Incremental Costs $243,200

Total Costs $546,500

Staffing of an Average 3 Phase Snow Emergency

Almost 350 personnel from six Departments/Divisions are directly involved with activities occurring during an average snow emergency. A summary of the personnel involved is shown in Figure 4.

The Field Services Division provides 103 personnel and the Equipment Services Division provides 144 personnel used during an average snow emergency. These personnel are distributed to one of four Maintenance Districts during the snow and ice control season. These personnel provide coverage 7 days a week and the regular shift pattern is:

- Days – 7:00 a.m. to 3:30 p.m.
- Swing Shift – 2:30 p.m. to 11:00 p.m. (typically only 1 to 2 staff)
- Night Shift – 10:00 p.m. to 6:30 a.m.

During an average snow emergency these shifts are begun earlier and are extended later to create a "12 hours on", and "12 hours off", shift pattern as follows:

- Night – 7 p.m. to 7 a.m.
- Day – 7 a.m. to 7 p.m.
- Night – 7 p.m. to 7 a.m.
- Day – 7 a.m. to 7 p.m.

The trucks, graders, and front-end loaders that do the majority of the snow plowing during a snow emergency are driven and operated primarily by the Equipment Services Division staff and some of the Field Services Division staff.

The Transportation Division provides 31 personnel for operation of the Impound Lot during an average snow emergency, and also manages the towing contractors that provide 67 tow trucks and 67 tow truck drivers.

The Traffic Control Authority (TCA) provides 43 personnel for enforcement tagging activities during an average snow emergency and the TCA also supervises an average of 18 inspectors from divisions of the Department of Operations and Regulatory Services that are used for additional enforcement tagging.

The Police Department provides an average of 25 off-duty police officers for enforcement tagging.

Alley plowing contractors provide 18 drivers and 18 pieces of equipment for use in alley plowing and are managed by the Field Services Division.

FIGURE 4
Summary of Personnel Utilized During An Average Snow Emergency

Field Services	Number of Staff
Engineer III ½	1
Supervisor II	1
Supervisor I	5
Foreman	18
Maint. Crew Leader	20
Construction Maint Laborer	54
Street Ops Specialist	1
Clerk Typist II	3
	103

Regulatory Services	
Inspectors	18
Traffic Control Agent I	33
Traffic Control Agent II	6
Supervisor	1
Supervisor	1
Clerical	2
	61

Additional Contracts	
Alley loader operators	18
Tow Truck drivers	67
Permit drivers/operators as needed	5-10

Equipment Services	Number of Staff
Dispatcher	4
Const. Equip Operator	50
Truck Driver	90
	144

Transportation	
Vehicle Shift Supervisor	2
Vehicle Records Aide	14
Lot Attendant	8
Const. Equip Operator	3
Security Escorts	4
	31

Police	
Off-Duty Officers	25
	25

Equipment/Materials Used During an Average 3 Phase snow emergency

Approximately 60 pieces of snow plowing equipment are used on Phase 1 of an average snow emergency, 80 are used on Phase 2, and 80 are used on Phase 3. The summary of the materials and equipment utilized during an average snow emergency is as follows:

FIGURE 5
Summary of Equipment and Materials Used During an Average Snow Emergency

Field Services	
Front-end Loaders for plowing alleys (contract)	18
Salt (in tons)	1200
Sand (in tons)	1600
Transportation	
bus & driver for escorting citizen's to vehicles (contract)	1
Loader/Blower for lot clearing	1
Equipment Services	
Seasonal equipment:	
Tandem axle trucks	34
Single axle trucks	12
Graders/patrols	3
Front-end loaders	17
Hourly equipment:	
Tandem axle trucks	25
Single axle trucks	10
Motor Graders (contract)	14
Front-End Loaders (contract)	4
Regulatory Services	
TCA Vehicles for enforcement tagging	17
PW Vehicles for enforcement tagging	15
Police Department	
Police vehicles	12

Enforcement – Tagging and Towing During an Average 3 Phase snow emergency

The sequence of routes to be tagged and towed is determined in an annual pre-snow season meeting between the Public Works Department and the TCA. Enforcement is coordinated with the plowing routes to keep enforcement in front of the plowing. Some priority tag and tow routes are completed first for areas that historically have large numbers of violating vehicles. After the priority routes are completed the taggers and towers follow the route sequence of the plow routes.

The average number of staff writing tags, number of tags and number of tows is as follows:

Phase	Schedule	Number of staff tagging	Number of tags	Number of tows
Phase 1	9 p.m. to 8 am	18 inspectors 25 off-duty police officers	396 2,025	592
Phase 2	8 am to 8 p.m.	32 TCA agents	4,320	515
Parking Change-over	no tagging or towing occurs	0	0	0
Phase 3	8 am to 8 p.m.	32 TCA agents	2,848	557
		totals	9,589	1,664

Phase 1 tagging is conducted by 18 Department of Operations and Regulatory Services (DORS) inspectors and 25 off-duty police officers. Phase 2 and Phase 3 tagging is conducted by 32 TCA traffic control agents.

A minimum of 67 tow trucks are required by contract to be towing during each phase of a snow emergency. Six towing districts have been established within the City and each district is serviced by a contracted towing company. The contract for each district requires that a minimum number of tow trucks be operating in a district during each phase of a snow emergency as follows:

Minimum Number of Tow Trucks Required in Each Towing District

Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total
7	7	18	10	15	10	67

All towed vehicles are delivered to the City's Impound Lot at 51 Colfax Avenue North, which is located immediately west of the Downtown area. The Transportation Division manages the Impound Lot and manages the towing contractors.

The Impound Lot typically has 1200 vehicles stored on-site and has overflow capacity to store an additional 1400 vehicles at one-time. During snow emergencies that generate a large number of tows such as 1500-2000 over 3 Phases (or back-to-back snow emergencies) the capacity of the Impound Lot is exceeded and vehicles impounded for snow emergency parking violations are stored under the I-394 bridges, and within the Linden Yards Storage area.

Service Levels

The service levels provided during a snow emergency are as follows:

Snow Emergency Routes – roadway will be plowed full street-width with driving lanes maintained as closely to bare pavement as possible and parking lanes maintained to a packed-snow condition at a minimum, with sanded hills, curves, and intersections as required.

Non-snow emergency streets – roadway plowed full street-width in a snow-packed condition at a minimum, with sanded hills, curves, and intersections as required.

Alleys – maintain width of alley pavement in a snow-packed condition at a minimum, with follow-up spot sanding of critical areas as resources allow and conditions warrant.

Communications

The methods of communicating snow emergency information include the following:

- **Press Packet** - sent to media outlets in early fall
- **348-SNOW telephone message** – receives approximately 25,000 calls per day during a snow emergency
- **Somali telephone message** – 673-2141
- **Spanish telephone message** – 673-3819
- **Fax notification to media and others** – press releases sent to the four major television stations, 11 radio stations, three major newspapers, MnDot, AAA Motor Club, Minneapolis Park and Recreation Police, Hennepin County Violations Bureau, ECC, Minnesota Daily, and Associated Press

- **Be Snow Smart brochures** – printed in English, Somali, and Spanish; distributed to businesses, community organizations, ethnic organizations, universities, hospitals, hotels, and social service organizations
- **City Calendar inserts** – instructions printed in English, Somali, and Spanish; 200,000 City calendars printed and mailed to every household in the City of Minneapolis
- **City Web Site** – updated each snow emergency phase
- **Email Alert** – approximately 6,000 subscribers
- **Email notice on Mpls Forum Listserve**
- **Email to City employees**
- **Notices on City Cable 14(and Channel 34)**
- **PW Handouts** – PW Maintenance Districts have a one-page handout that they give to citizens when requested
- **TCA Handouts** – traffic control agents have a one-page handout they give to citizens when requested

On-Street Signage

A total of 5,400 SE route signs are currently in-place on the 4,000 blocks that comprise the SE routes. These signs are placed within the first 50' of a block.

The street signs at every intersection are color-coded for SE uses. Blue indicates it is a SE street, brown indicates an east-west street, and green indicates a north-south street. These color codes are remnants of the previous north-south, east-west SE plan.

Number of Vehicles and Availability of "On-Street" and "Off-Street" Parking During Snow Emergencies

The level of service provided during a snow emergency is significantly affected by the number of vehicles violating parking restrictions

To better understand the issue of violating vehicles, analysis was conducted to identify the number and location of vehicles within the City, and the availability and location of "on-street" and off-street" parking.

It is estimated that a total of 207,000 vehicles are owned by residents of Minneapolis households (estimate was created from the dicennial Census of Population and Housing). This total number of vehicles does not include vehicles located in the City that are not owned by Minneapolis households and that may increase the count; however, the increase may be offset by Minneapolis vehicles that are being driven outside of the City.

During a SE, each of these vehicles must find parking space either "on-street" or "off-street".

The following map titled Vehicles in Households by Census Block Group, 2000", shows where the largest number of vehicles exist within the City of Minneapolis. A high concentration of vehicles occur in the neighborhoods immediately east of Lake of the Isles and Lake Calhoun and into the Loring Park and Steven Square area. Powderhorn Park, Marcy-Holmes, and Cedar-Riverside also show high concentrations of vehicles.

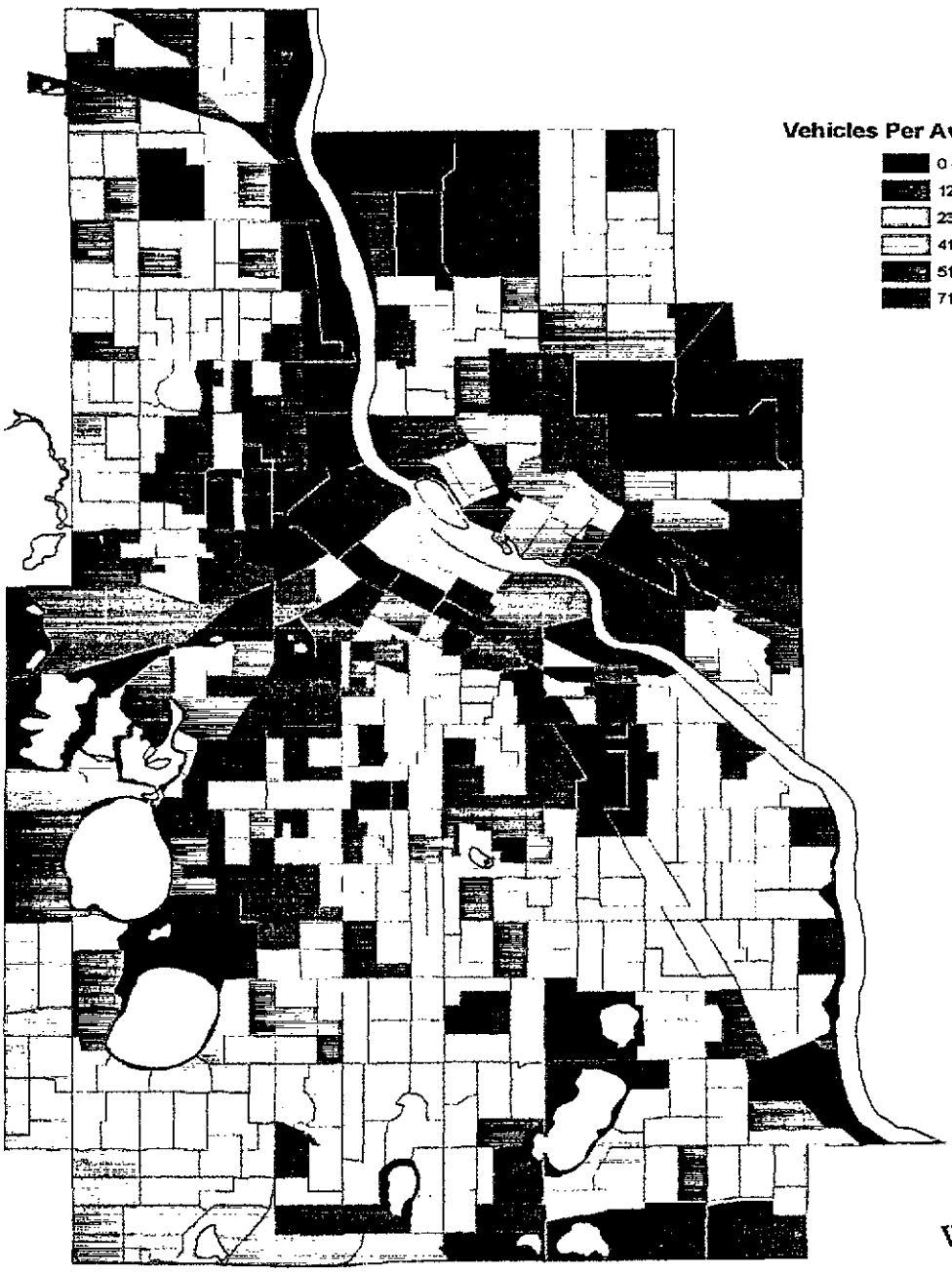
The on-street capacity was identified by computing the curb space available for parking on an average city block. A long block face can provide parking for 25 vehicles. A short block face can provide parking for 9 vehicles. Therefore an average City block can accommodate 68 vehicles "on-street". This estimate includes space required for driveways, alleys, and parking restrictions near features such as hydrants and stop signs. The on-street parking capacity is nearly consistent throughout the City.

The "off-street" capacity was determined by using the Assessor's parcel data which contains the total number of parking spaces contained on each parcel. The map titled "Off Street Parking by Census Block Group, 2002", identifies how this capacity varies throughout the City.

The combination of number of vehicles, on-street parking, and off-street parking, creates the final map titled "Excess Parking Spaces by Census Block Group". This map identifies areas where the number of vehicles exceed the amount of on-street and off-street parking and the ability to comply with snow emergency may be more difficult.

Snow Emergency Analysis Project

Vehicles in Households by
Census Block Group, 2000



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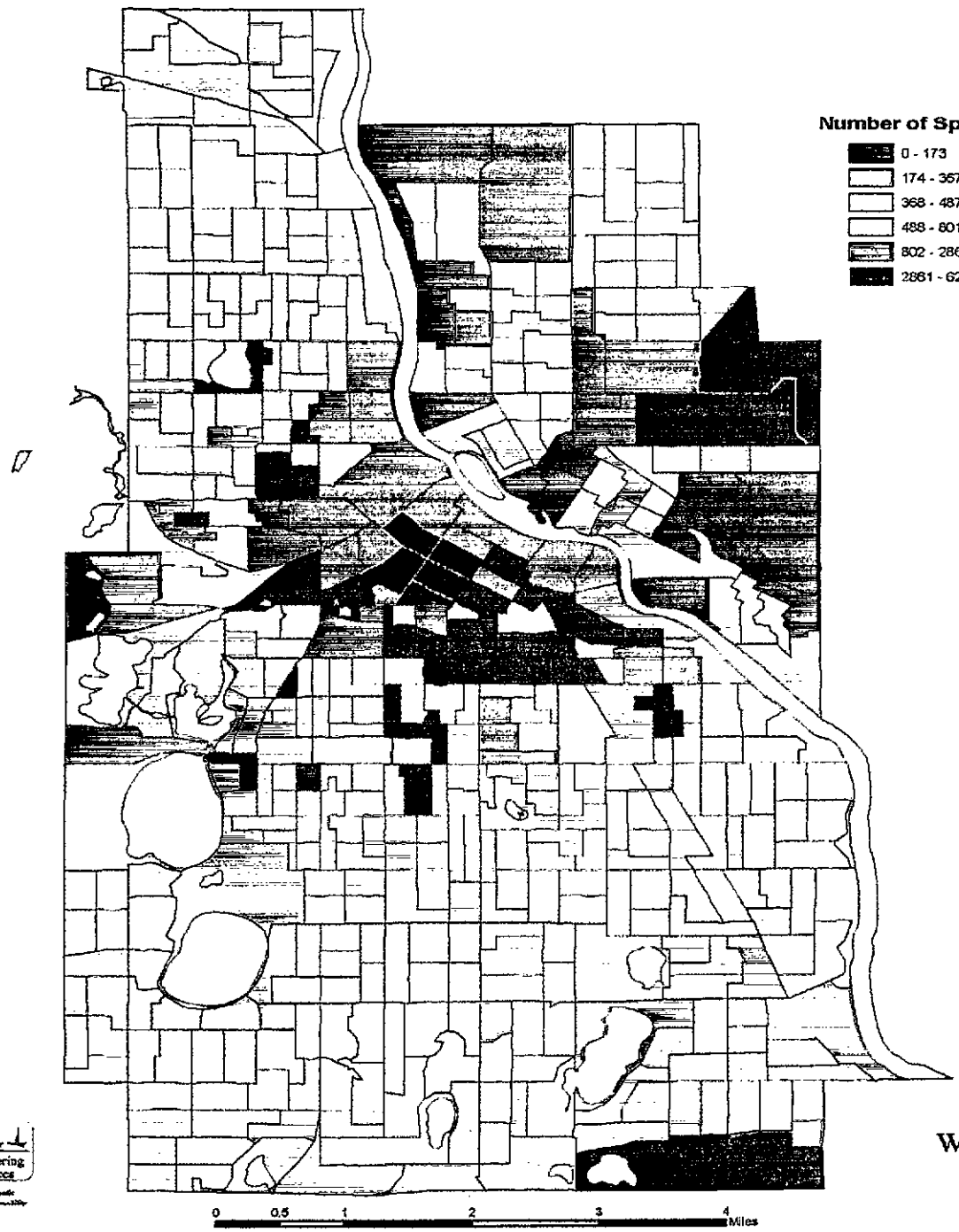
(612) 673-2431
Engineering Services

Snow Emergency Analysis Project

Off Street Parking by
Census Block Group, 2002



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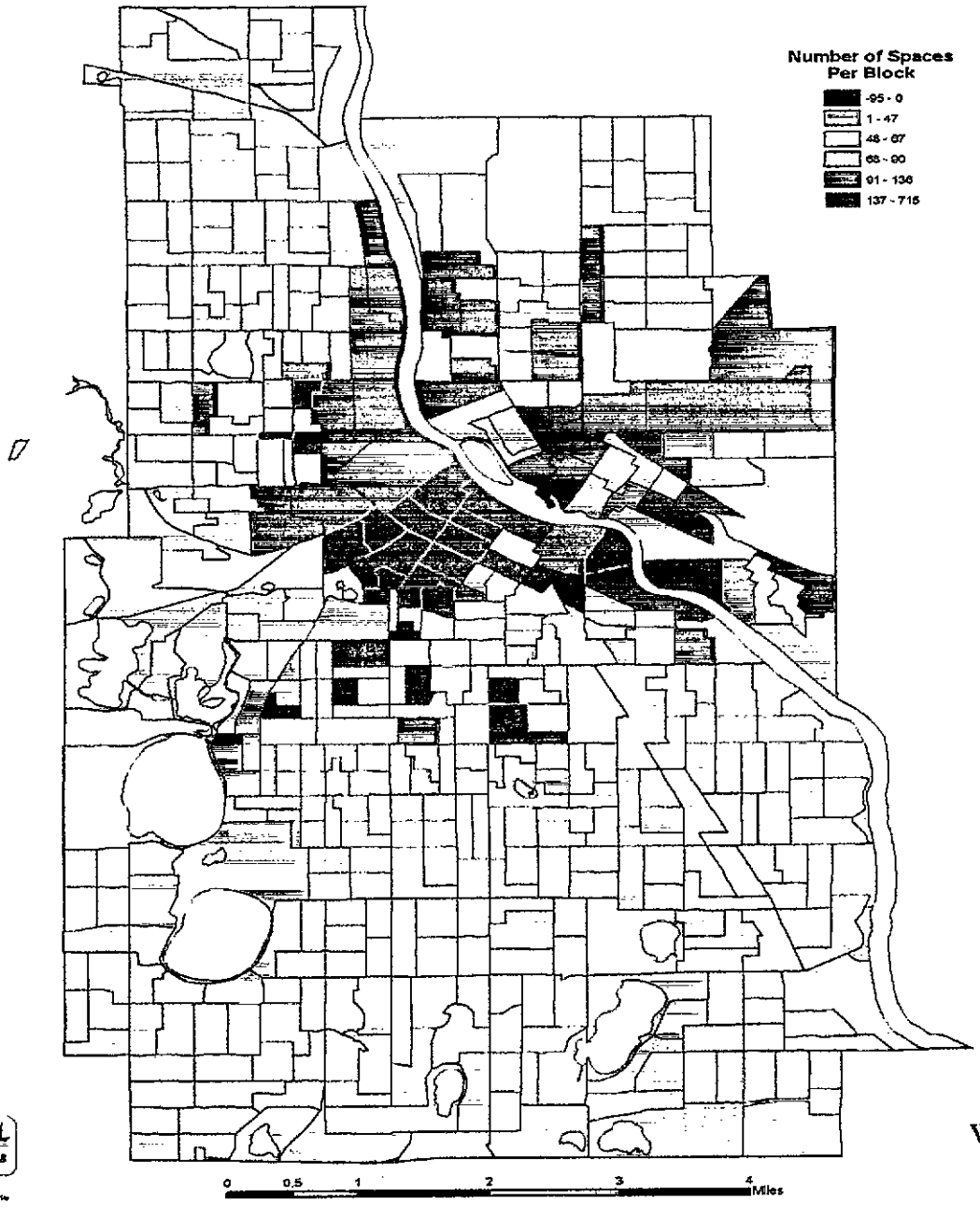
Engineering Services

Snow Emergency Analysis Project

Excess Parking Spaces by Census Block Group



Minneapolis Department of Public Works
Print Room (612) 673-2431 | Engineering Services

Analysis of Enforcement - Tagging and Towing

Further analysis was conducted to understand where tows occurred from and when they occurred during the 3 Phase snow emergency.

Some preliminary numbers of violating vehicles, tags and tows are as follows:

Estimated number of violating vehicles per SE	Average number of tags per SE – last 3 snow seasons	Average number of tags per SE – last 3 SE's	Average number of tows per SE - last 3 snow seasons	Average number of tows per SE – last 3 SE's
9,000-12,000	8,302	9,589	1,664	1,916

The number of tows is significantly less than the number of tags because the travel time to tow a vehicle to the Impound Lot restricts the towing rate, vehicles are moved by citizens after being tagged, and tags are removed by citizens before being towed (a vehicle can not be towed without a tag appearing on the vehicle). The number of tags and the number of tows have increased during the last 3 SE's.

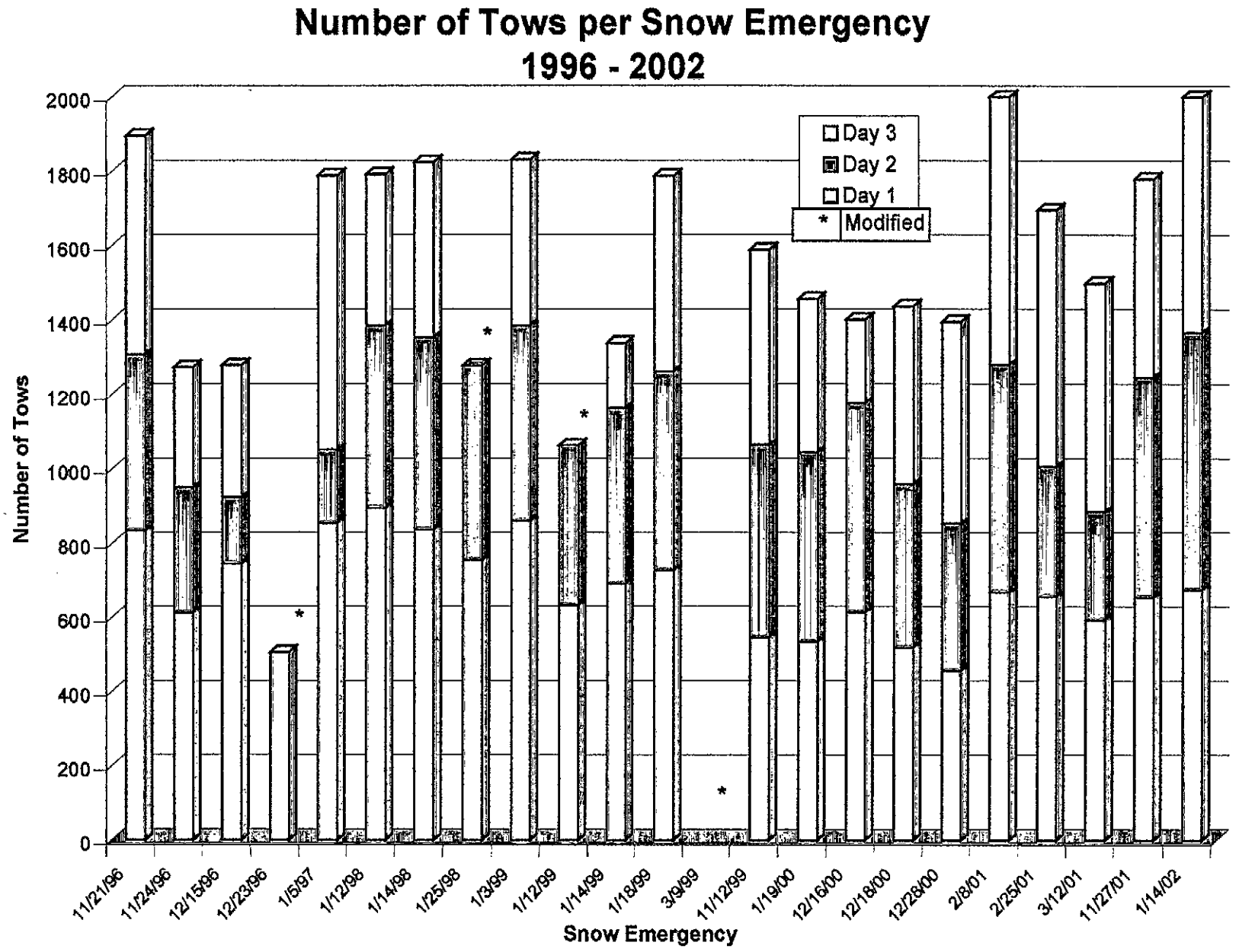
Since the 1999-2000 snow season when the current required minimum number of 67 tow trucks for a SE was begun, the average number of tows per Phase has been:

- Phase 1 – 592 tows
- Phase 2 – 515 tows
- Phase 3 – 557 tows

The number of tows that have occurred each Phase for each snow emergency for the last 6 years is shown in the following bar chart titled "Number of Tows per Snow Emergency 1996 - 2002". The number of tows occurring during Phase 2 is slightly less than Phase 1 and Phase 3. However, no further significant pattern or trend can be identified between Phases or between snow emergencies.

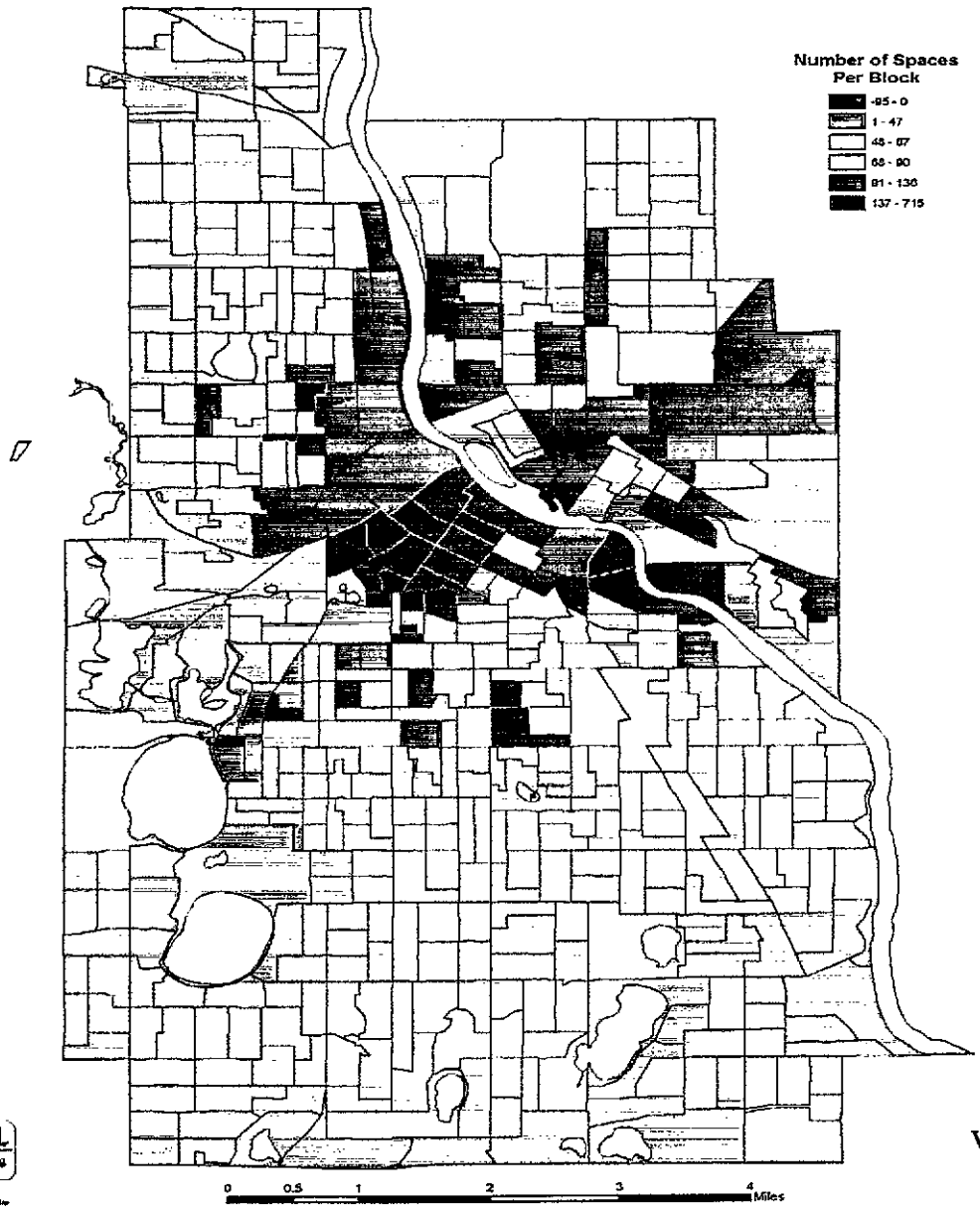
The location that violating vehicles were towed from is shown in the map in the map titled "Vehicles Towed to Impound Lot During 1999 for Snow Emergency". that was produced for previous analysis of the Impound Lot operations.

The number of violating vehicles, tags, tows, and the total number of vehicles owned by the households in Minneapolis is shown in the graph titled "Number of Total Vehicles, Violating Vehicles, Tags, and Tows, per Snow Emergency 1996 – 2002". The number of violating vehicles is only 5% of the total vehicles. The number of tags is 4.6% of total vehicles, and the number of tows is less than 1% of total vehicles. This indicates there is a 95% compliance rate with the current snow emergency parking restrictions.

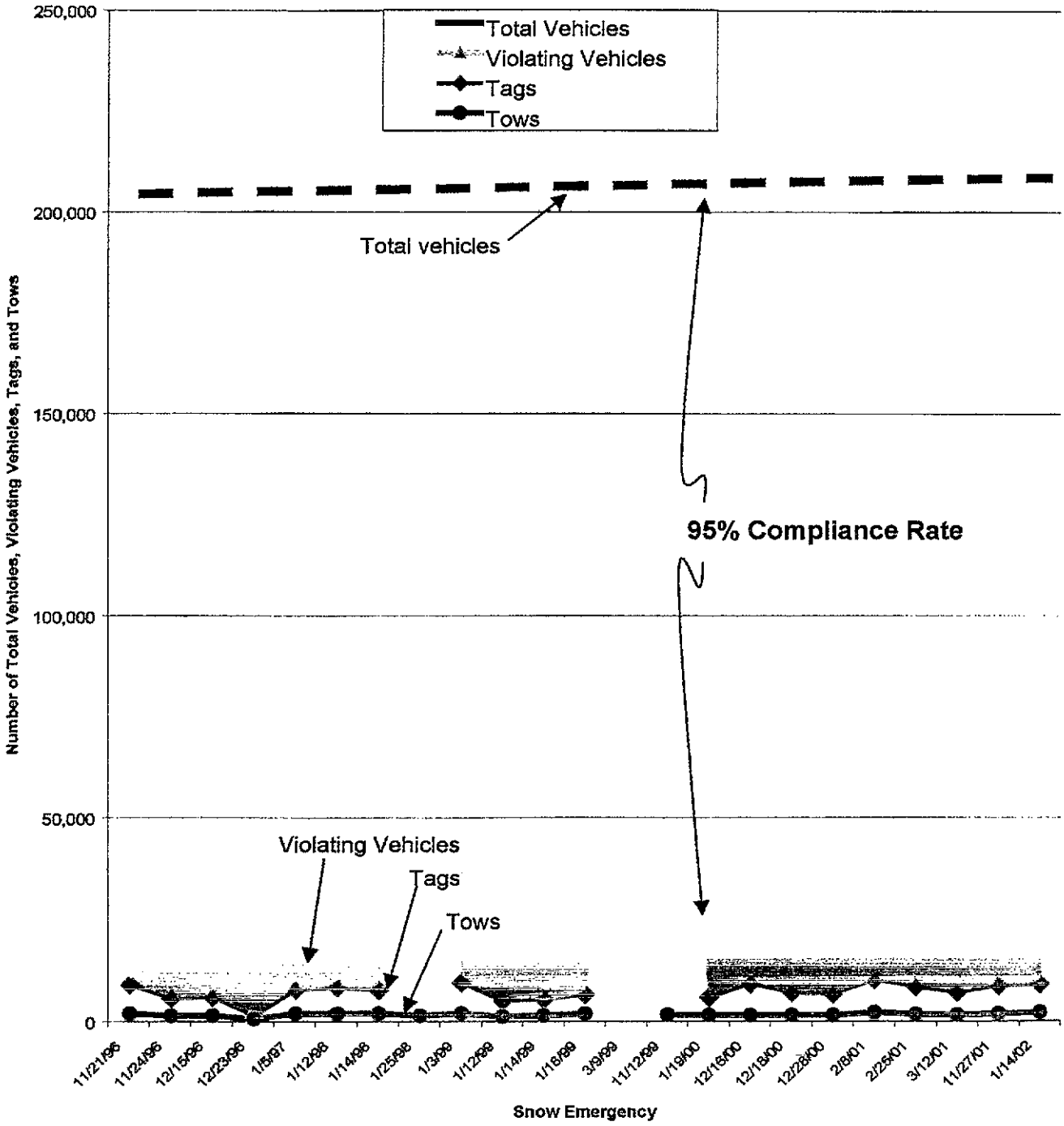

Number of Tows per Snow Emergency
1996 - 2002
Day 3
Day 2
Day 1
* Modified
Number of Tows
2000
1800
1600
1400
1200
1000
800
600
400
200
0
11/21/96
11/24/96
12/15/96
12/23/96
1/5/97
1/12/98
1/14/98
1/25/98
1/3/99
1/12/99
1/14/99
1/18/99
3/9/99
11/12/99
1/19/00
12/16/00
12/18/00
12/28/00
2/8/01
2/25/01
3/12/01
11/27/01
1/14/02
Snow Emergency

Snow Emergency Analysis Project

Excess Parking Spaces by Census Block Group



Number of Total Vehicles, Violating Vehicles, Tags, and Tows per Snow Emergency 1996 - 2002



Public Official's Interviews and Comments

Prior to January 1, 2002, all outgoing Council Members, re-elected Council Members and the outgoing Mayor were invited to be interviewed regarding snow emergency activities. After January 1, 2002, the newly elected Council Members were invited to be interviewed.

A total of three outgoing Council Members were interviewed, 6 re-elected Council Members and 6 newly elected Council Members, and the outgoing Mayor were interviewed. A number of the Council Members and the newly elected Mayor attended some of the Neighborhood Informational meetings. The outgoing City Coordinator was also interviewed.

During the Interviews, the public officials were asked the following questions:

- What issues are important to you and your constituencies regarding the current snow emergency parking restrictions and parking procedures?

- What are your expectations for level of service in the future?

The most often repeated comments were:

- Alley plowing should be improved
- Windrows at intersections are a problem
- Snow plowed into driveways is a problem
- We need to tow more – violating vehicles are a problem and generate many complaints

Many additional comments were received during these interviews and these are summarized in the following categories:

Miscellaneous Issues

- Special service districts are a positive
- north part of town thinks south gets plowed first
- south part of town thinks north gets plowed first
- very few complaints
- people are satisfied with level of service
- doing sidewalks is an issue
- PW does a great job
- who gets plowed first
- get information to CM about 24 hr so they can decide once and for all
- we should be the best at snow plowing
- it is very positive that this study is being conducted
- perception of inequity of who gets tagged, towed, and plowed first
- can we customize for parts of the City or would it be too confusing
- need curb to curb plowing

- snow is plowed onto sidewalks
- how can we reduce the cost of snow emergencies - call fewer snow emergencies
- snowplowing is good in Mpls.
- Salt is destructive to vehicles
- a lot of compliments regarding snow removal in Mpls.
- Too much sign clutter
- we have B+ snow plowing, do we want A for a cost
- map the density of vehicles in City
- sequence of tagging, towing, plowing is important - plows get ahead of taggers

Alleys, Driveways, Windrows, and Corner Cleaning

- complaints from seniors regarding snow dumped into driveway
- alleys get done quickly
- continue good alley service
- windrows at corners and bus stops are a problem
- corner cleaning is important
- driveways plowed in is a problem
- lake at end of alleys
- ends of alleys get plowed in
- doing the alleys first is good
- ruts in alleys
- ice ridges in alleys
- impressed with alley plowing

Parking Issues

- off-street parking is adequate
- off-street parking is inadequate
- no parking is available
- do public/private parking - "neighborhood friendly snow emergency lot"
- co-share parking with other lots
- garages are full - do a "clean the garage day"
- where do they move their cars
- not interested in a change in plowing, more a change in parking
- one-side parking ban is good - easy to understand - residents like it

Enforcement, Tagging and Towing

- more complaints re snowbird vehicles than any other issue
- believe residents would pay a larger ticket rather than go to the Impound Lot
- balance enforcement equitably throughout the City
- angry residents about car being towed
- angry residents about cars not being towed

- could do tow around the block
- tow around corner is ok
- tow around the block
- tow around corner is a logistical nightmare
- if snowing - get your car off the street - if they don't move then tow them
- the pain of a tow and fine is way out of line for the benefit of better plowing
- residents must be responsible
- residents hate snowbird vehicles
- reduce the aggravation of being towed
- do tow operators tow closest to their office and closest to the Impound Lot
- too many cars towed in their ward
- towing is punitive, make it proactive to change behavior
- need faster service at the Impound Lot
- tag and tow more

Complexity, Communication, and Confusion of the Current System

- confusion is the biggest issue
- existing system complicated
- new residents do not know what a snow emergency is
- how do you know it is a snow emergency route
- need better multi-lingual communication
- too complex a system to communicate
- people don't know about snow emergencies – break through that communication gap
- communication is too complex, need to simplify the message
- use other communication networks and methods
- need more effective communication - different methods
- apartment managers can tell residents about snow emergency
- personalize message "your car may be towed"
- communicate to drivers from outside the City
- communicate in a clear manner
- too confusing of a system

Quality vs. Speed vs.Cost

- prefer quality vs. speed
- quality more important than speed
- quicker plowing is a plus - identify the impacts
- faster plowing is better
- no large clamor for 24 hr
- not a lot of calls for faster snow removal
- can't see a 24 hr if additional cost
- concern about cost of 24 hr vs. value-added
- do not hear a lot of demand for 24 hr unless substantially better
- not a strong demand for 24 hr unless higher quality

- faster is better if quality is there
- need quality, timing, and faster
- if existing plan is good - no need to change
- get snow off streets quicker
- current plan works
- other wards may want 24hr - my ward does not
- quality issues with current system
- need to see a city-wide plan make sense before we change current system

Neighborhood Informational Meetings and Citizen's Comments

A series of four Neighborhood Informational Meetings were conducted to reach out to neighborhood residents and businesses to discuss the potential impacts of a 24-hour alternative and to receive comments from the residents and businesses. The four meetings were:

1. Folwell Community Center – March 26
2. Logan Park Community Center – March 28
3. Longfellow Community Center – April 2
4. Painter Park – April 4

Many comments included concerns about alley plowing, windrows and driveways. communication of snow emergency information was an important issue.

The major comments from each of the meetings are as follows:

Citizen comments from Neighborhood Meeting #1

1. City doesn't tow fast enough
2. More important to have a uniform system instead of odd-even
3. Increase parking ticket up to $500
4. Could use Church lots for off-street parking if city plowed them
5. Work through neighborhood organizations to communicate
6. Signs on cars in multiple languages
7. Use Freeway boards to communicate
8. I did not know odd-even side switched each year – you need to communicate
9. Snow emergency signs to block club leaders to post in yard
10. Give snow emergency information with vehicle license tab renewals
11. Repeat alley plowing
12. Make citizens clean their own alley windrow
13. Allow parking after plow goes through a street once

14. More info in literature about where to park
15. Put info about where to park in e-mail instead of referring to website
16. Don't sacrifice quality for time

Citizen comments from Neighborhood Meeting #2

1. Our street didn't get ticketed – even after calling the city (Philips, no garages)
2. Get plowed in at S. 9th street and no ticket and towing enforcement
3. near 1504 4th street, need some initiative for off street parking
4. Have rental licenses require off-street parking
5. Encourage garage use
6. Increase fine for repeat offenders of parking violations
7. Let on-duty neighborhood cops write tickets
8. Create a limit for the number of cars per residential unit
9. Use Municipal parking ramps and small vacant lots during a snow emergency
10. Need better alley plowing to get to garage
11. Keep blades on ground, plow correctly in the alleys
12. Go back to city staff plowing the alleys instead of private contractors
13. The reverse crown in alleys causes plowing problems
14. We don't get plowed
15. Alley is a priority
16. Some of the concrete sections in alleys float and cause plowing problems
17. Fine people who throw snow in the ROW
18. Clear corners when we call in
19. Clear bridge sidewalks
20. Level undesirable houses and allow off-street parking on the lots
21. Do shared parking with commercial lots by using a parking permit
22. Use Critical Parking Areas to protect residents ability to park near homes
23. Increase fine for tow around block
24. Tow to nearest off street parking lot
25. Tow around block helps the violators
26. Raise ticket and tow price
27. Will 24-hour plowing be curb to curb? Emergency vehicles need to get through
28. Plow quicker, dump windrow on sidewalk, then the City should plow sidewalks

29. Get more people to write tickets – on-duty police
30. In favor of spending more $ to staff the snow emergency effort
31. One side parking ban was hell
32. Change state law on towing fines to allow increase of fines
33. I could not comply with 24 hour plan parking restrictions
34. Use a sensor light on sign to tell residents when a snow emergency is in force (need to protect from vandals)
35. Use positive phrasing on signs – such as "parking allowed here" – "Okay to park" signs
36. City should be parking friendly
37. Expensive to be a tow truck driver – lower fee
38. Use multiple impound lots instead of one impound lot
39. Make U of M and Augsburg accountable for parking problems because of their students
40. Use "in-house" towing
41. not getting violators in our block
42. Residents could volunteer to plow the street after snowbird vehicles move

Citizen comments from Neighborhood Meeting #3

1. 348–Snow is overwhelmed and does not answer at times
2. Website has been down
3. Maintain quality in Mpls. (do not be like St. Paul)
4. Continue curb to curb and multiple passes
5. Mpls goes down a street 3 times
6. St. Paul does not do a good job of plowing
7. How many signs will be placed on a block
8. Neighborhoods may resist signage
9. The more signs the better – they are important
10. If we don't get more compliance, we are St. Paul
11. Buffalo uses tow around the block but has different density and public transit
12. Where do you move cars to in the wedge?
13. Tow around the block creates a car theft problem – where is my vehicle?
14. Plow fills driveways and handicap areas and pedestrian access – responsibility should be to not plow people in

15. 24 hour – you would only shovel out once
16. Intersection ridges high
17. Plowing out of corners is not high quality
18. Publicize number to call for PW service
19. Liability issues in private lots if use co-share lots
20. Concern for abandoned vehicles in co-share lots
21. They have existing use for the parking lots, cannot fit anything else in
22. Worth investigating co-share in tightest parking areas if other cities using this technique
23. Run buses to impound lot
24. Include info in ticket about where the impound lot is and what buses go there
25. OK to increase ticket price but may not increase compliance
26. Media does a disservice by making jokes and not conveying info
27. The City web site is good for snow information
28. Should plow the alley even if the snow will melt in a week, we still need to get into the alley
29. Size of handicap transfer zones takes away curb parking
30. Co-shared parking can be difficult – people could misuse it
31. Not a preference for off-street co-share parking
32. Do not do off-street co-share parking – too many logistics issues
33. City should be held to plowing in 24 hours, same as they hold residents to for sidewalks
34. Congrats to PW for adding alley plowing – it is a great improvement
35. Citizens should take responsibility during snow emergencies
36. Ask folks who were towed why they got towed
37. Do E-W and N-S instead of Odd Even
38. Do 3 days of day time plowing – no night plowing
39. change snow emergency start times to coincide with the end of the snowfall
40. don't go so fast that plows spray buildings
41. How many are repeat offenders

General poll of preference between snow plans:
4 were in favor of a 24-hr plan
3 were in favor of the existing system
8 did not have a preference

Citizen comments from Neighborhood Meeting #4

1. How many offenders are visitors to the City
2. 36 Hours before the plows get to my neighborhood
3. the current system in Mpls looks like it was plowed by committee
4. Takes so long to plow that we are driving on ruts
5. There are mountains in intersection
6. Too far to get to a snow emergency route – get stuck
7. Cost? Can you shrink impound lot or tow less?
8. Plow low-density area first? Would dense area want to be plowed last?
9. What about pedestrians? Little plow on sidewalks following big plow on street?
10. No one wants to be plowed last, City should find what is most efficient and do it
11. Plow less dense first because dense area has more snow emergency routes
12. Do no ticket and towing in certain areas
13. Like signage – especially for visitors
14. Alleys not clear
15. Inconsistency of who gets plowed when, and level of service
16. Alternate parking year round
17. Don't care about length of time to plow, want to see pavement curb to curb
18. Use the Milwaukee system - Even – odd day or even day starting at midnight – 6 hour time out, 6 PM – midnight
19. Change equipment to improve performance
20. Plow sidewalks - cost about $2-3 million per year and it would take five days – put a surcharge on utility bill for 5 months – pilot – block basis vs. city wide as public good
21. Clean out bus stops 8pm – 9pm
22. Citywide parking permits and change sides each day
23. Signed system allows customization
24. Allow plows to plow both sides of a street if it is free of vehicles
25. Easy to change signs on a specific street
26. Don't leave windrow that is impossible to drive through, better not to plow at all or do a full snow emergency
27. Shared parking – great idea with time limit (Columbus Church near 25thoffered lot)

28. Co-share off-street requires blacktop, fence, light, permit for neighborhood vacant lots, tear down crummy house, creates places for drug dealers
29. Tow around block great, so I don't have to dig my car out
30. Put a price tag on tow around block - $50 pilot project
31. Don't want unknown car dropped in front of my home
32. Use multiple languages in written communications
33. Could we use sound vehicles with loudspeakers to alert citizens about a snow emergency and parking restrictions
34. Already have too many signs
35. Alternate parking year round – hard in 6th ward and St. Square – Condition people
36. Don't need day and night signs – just signed or not signed
37. We always declare last versus St. Paul
38. Snow emergencies are a best kept secret; use air raid sirens, loudspeakers, taggers blare horn first then tag
39. Use days for parking restrictions e.g. "Tues – park on even side"
40. Street signage could use an existing pole and have flippable signs like hazardous materials signs
41. Incremental fines for repeat offenders
42. Start before 9 PM
43. There could be two categories of snow emergency
44. Need a lot to put car in – if gone for a week
45. Impound lot should be proactive to find owners of vehicles towed
46. Do preemptive tow
47. 24 hours plowing is a priority, love more signs, current system is punitive
48. Increase # of taggers
49. Need something like highway helper
50. Guys in neighborhood can pull people out – don't regulate them as towers
51. Odd-Even is sometimes hard to determine within the City
52. Eliminate liability to city for hitting cars that are violating parking restrictions
53. Paint idiot cars that violate parking restrictions
54. Increase the fine to $700 for private plowers that push snow into street
55. Be consistent with St. Paul
56. There is differential treatment between Stevens Square and 50th –Xerxes

57. People are oblivious to signs
58. Need consistency over the years with the system, it will be easier to train people
59. Will 24 hour increase compliance?
60. What percent of towed vehicles (of all vehicles) is acceptable?
61. If a resident volunteers to clear all the sidewalks on their block, could they get a credit on a city service such as the water bill? Some residents already use their own snow blower to do an entire length of block as a courtesy to their neighbors
62. Like the concept of co-sharing off-street parking – they already do it informally in his ward

RESPONSE TO INFORMAL POLLS:

Should the neighborhoods be allowed to choose/customize their snow removal plan?

-Consensus was "no"

How many favor 24 hour or existing plan?

-24 hour - @ 11 people

-Existing plan - @ 6 people

Additional Input via Email, Phone Calls, and Letters

The following additional citizen input was received from emails, telephone calls, letters, and citizen comment cards that were distributed at the Neighborhood Informational Meetings.

→ Alley plowing is worst I've ever seen this year, it was great last year
→ SE in Mpls work great, the streets in St. Paul are a mess
→ In favor of 1 day plowing, synchronize with St. Paul
→ Plow school bus loading zones first, and make all streets around schools SE routes
→ City workers do a great job plowing, it can not be done faster with all the cars in the City – keep up the good work
→ SE process is terrible, we should have 24-hour, get cars off the street
→ I plowed in Mpls for 31 years, we did 24-hour in 1965, it did not work then it will not work now – too many cars. St. Paul only does 24-hour plowing of the center of their streets – Mpls does curb to curb
→ I Like more signage, 24-hr system will help to know when plow will arrive, know when to shovel driveway, City expects 24-hr for residents clearing of sidewalk, we expect the same for the City streets
→ Current system is too complex to communicate

- → Allow parking of vehicles in yards during snow season, do tow around the corner on 2nd and 3rd day
- → Do not appreciate plow dumping snow in my driveway – use a snow gate on the plows
- → Use seasonal 1-sided parking ban
- → Current method of plowing is most sensible, St. Paul streets are not plowed as well as ours
- → Strongly support a 24-hr plan, if City workers can't do it hire contractors
- → Mpls does a superb job at snowplowing, parked vehicles are the problem, 24-hr will fail and be expensive. Use seasonal 1 sided parking ban. Only give tags on day 3
- → SE are handled efficiently now, no place to park, 24 hr will create more tows and more angry people
- → Create a lock box program so City workers can move cars
- → St. Paul can do 24-hour, why can't we
- → Follow the plowing schedule we have set
- → Mpls should go to a 24-hour
- → You never tow cars from my street
- → I have seen City employees placing tickets on cars after the plow has gone by; tow the cars around the block, or to a church parking lot; City is gouging the public by towing, my observations right or wrong influence my attitude towards the city and my vote at the polls
- → St. Paul is better than Mpls., parking not a problem in my area, snow pushed into sidewalks
- → I have no problems complying with parking restrictions
- → People on my block are new arrivals and don't know about SE's
- → We have no boulevards and sidewalks are buried by the plows
- → No more signs – they are horrible – ugly – the system works fine
- → 24-hour plan sounds great – more signs
- → need better notice on all TV news shows
- → 348-SNOW is great idea but the message is so complex I don't understand
- → clear the "parking bays" on parkways
- → current system is best - with better, more detailed notice on website, email, TV
- → provide off-street parking near where I shop, it's days before my alley is plowed
- → communicate a positive message and where to park – instead of "no parking"
- → use of-street parking in neighborhood lots, I support the current 3 day plan with increased enforcement, the 24-hour plan would make parking impossible
- → keep the current system and tow people who do not move their cars

Citizens Survey

The Minneapolis Citizens Survey was conducted between November 2001 and January 2002. A total of 1,210 telephone interviews were conducted and a number of questions related to snow emergency services were included in the Survey.

When asked which of the following sources would you prefer to get snow emergency information, the following percentage of respondents indicated:

90% - radio
73% - signage
66% - 348-SNOW
59% - City calendar
56% - snow brochure
49% - city website
46% - newspaper

When asked their opinion of how the City could better help them comply with parking restrictions during snow emergencies, almost 40% indicated they either don't drive, didn't think it was a problem for them, or weren't able to make a suggestion.

Almost 25% of citizens indicated some improved means of notification would help them comply, and 21% indicated signage improvements would help them comply.

Almost 15% said snow emergency parking restrictions are not a problem now, and 0% indicated faster plowing of streets and alleys would help them comply.

When citizens were asked their level of satisfaction with snow plowing, and how much future attention should be devoted to snowplowing, they indicated they were satisfied with snow plowing services, and that the City should devote slightly more attention to snow plowing. The Near North Community indicated a higher level of attention should be devoted to snow plowing than the other 10 communities.

When the results of the level of satisfaction and need for future attention for snow plowing were graphed with comparable results for 14 other City services, snowplowing was near the middle of satisfaction and future attention compared to results of other City services.

A total of 44% of the respondents believe the City should devote some more attention to snow plowing. A total of 26% of respondents believe that property taxes should be increased to maintain or improve snow plowing service.

Minneapolis Public Schools

The Director of Transportation Services for the Minneapolis Public Schools (MPS) was interviewed to identify the MPS issues and comments regarding the SE operations and he stated that he was very satisfied with the current 3 Phase plan.

Over 650 MPS buses operate on City streets every morning and every afternoon of a school day. The Director of Transportation is responsible to determine if schools will remain open during snow events. He determines that if his bus drivers can get to work during snow events, it indicates the roads are plowed well enough for his buses to operate and schools to remain open.

During the last significant snow event of the past season which was declared a SE, he sampled City streets by driving routes about 4 a.m. and determined that the plowing done by City staff allowed his drivers to get to work, and therefore his buses could make their routes. The MPS stayed open and did not declare a "snow day". The City of St. Paul elected to close schools during this same snow event and declare a "snow day".

The MPS buses serve 118 buildings and the school loading zones are currently cleared by City plows.

If the City were to convert to a 24-hour plan he was concerned about the following:

- Time of declaration
- Time of start of the SE
- How back-to-back SE's would be handled
- The location of his schools needs to be considered in new routes

Metro Transit

The Manager of Street Operations of Metro Transit was interviewed to identify their issues and comments regarding the SE operations. The Manager stated they are satisfied with the current SE operations.

Metro Transit buses operate on City streets 24 hours a day. Over 550 buses are operating in Minneapolis during the morning and evening rush hours. The last time buses were stopped because of snow events was in 1991. The most beneficial SE feature for Metro Transit would be a one-sided parking ban. A permanent parking ban such as 11 p.m. to 5 a.m. would also be beneficial.

If the City were to convert to a 24-hour plan he would be concerned about the following:

- Maintain same level of service as current plan
- May need more "no parking anytime" in problem areas such as Hennepin and Lake
- May need more customization of clean-up after the 24-hours is done
- one-side of the street being plowed - they prefer both sides plowed in a phase
- Need good coordination of new routes with bus routes

He offered to assist in communicating SE information using signage in their bus, or using the audio system on the bus. This could help inform up to 33,000 bus riders each day.

Survey of Other Municipalities Snow Emergency Operations

A survey of larger snow cities and regionally adjacent municipalities was conducted to identify alternative "best practices" for snow emergency operations.

A total of 30 cities were contacted and sent a survey containing questions regarding their snow emergency operations. The 19 cities that returned completed surveys are shown in Figure 8 through Figure 14.

Some of the general findings from the cities returning surveys include:

- Most cities have some sort of snow emergency program.
- The amount of snow accumulation to declare a SE varies throughout the cities. Most are in the 3"-6" range. Buffalo uses 12"-16" to declare a SE.
- Winnipeg SE is 5 days long, Toronto and St Cloud SE's are 72 hours; Edina SE is 8 hours; Bloomington is 12 hours; and Rochester NY is 12-24 hours; however the tasks completed during each SE varies considerably.
- Minneapolis plowing standards appear to be generally consistent with the range of respondents.
- Seven cities use "tow around the block" – Buffalo, Denver, Edmonton, Greeley, Rochester NY, Toronto, and Winnipeg.
- Milwaukee and Buffalo use school parking lots for off-street parking during snow emergencies. Buffalo also uses church parking lots.
- Minneapolis has the highest number of towed and impounded vehicles with 1700 per SE (or 567 per day). St. Paul is second highest with 1400 per SE. Next highest is Milwaukee with 175 per day.
- A number of cities use a seasonal or year-round one-sided parking ban.
- Communicating SE information and managing expectations with the citizens is a continuing challenge for many cities.

Unique Snow Emergency Techniques Used by Other Cities

"Tow Around The Block" or "Mini-Tows"

This feature involves towing vehicles to the nearest plowed street rather than to the cities impound lot when the vehicle violates SE parking restrictions. This feature is used by Buffalo, Denver, Edmonton, Greeley CO, Rochester NY, Toronto, and Winnipeg.

The City of Buffalo uses this program extensively. During recent winters when severe snow events have occurred, the City has conducted over 1,500 tows around the block. The City uses 5 city-owned trucks and up to 28 contract tow trucks. Each tow truck can move up to 7 vehicles per hour, or up to 90 vehicles in a 12-hour towing shift.

A violating vehicle will be towed to the nearest plowed location that is less than 1000' from the original location. The parking enforcement officer records the vehicle license plate number, address the vehicle was moved from, and address the vehicle is moved to. This information is entered into a database and is then available to citizens through a telephone number or at the City's website within 6-8 hours of the mini-tow.

The Buffalo City Attorney has determined that if the "from address" and the "to address" are available to the citizen, the City is not liable for damages to the towed vehicle.

The fee for a SE parking violation is $15, and the fee for the mini-tow is $25. During recent, severe snow events during which the City has been forced to declare a "state of Emergency", the City would conduct the mini-tow and not charge the citizen.

Abandoned, stolen, and scofflaw vehicles are towed to the impound lot.

The City has used mini-tows for the following primary reasons:

- Allows quick plowing of the streets
- Shortage of "space" in their impound lot
- Public officials received substantial pressure from citizens that had been towed to the impound lot
- Towing to the impound lot was time consuming for the City and citizens, and costly to citizens

The City also uses loudspeakers on Traffic Enforcement vehicles and staff knock on residents doors to ask them to move violating vehicles.

"Co-Share Off-Street Parking"

This feature involves utilizing specific "off-street" parking lots for parking of citizen's vehicles during SE parking restrictions.

This program is used in Milwaukee and Buffalo.

The City of Milwaukee uses this program extensively. The City makes available 22 school parking lots and playgrounds for citizen parking at no charge from 7 p.m. to 7 a.m. during SE's. These lots are plowed by the City at the beginning of a SE. The City also allows parking during SE's at 58 City-owned lots at no cost, or for a minimal fee. These lots average about 40 spaces.

Th City of Buffalo also uses school and church parking lots for parking during a SE. The City owns the public school facilities and plows these at the beginning of a SE and makes them available on holidays and weekends when school is not in session. The City also has an informal policy of offering to plow church parking lots and private school parking lots during major snow events in return for those entities allowing free parking to citizens during SE's.

Additional SE Features Used by Other Cities

A number of other SE features are used by some of the cities including:

- Total parking ban on all streets until completion of SE
- Seasonal one-sided parking bans
- SE parking restrictions for only selected areas of the city
- Parking restrictions that are lifted once the street is plowed
- Communication techniques – temporary signage, early season warning tickets, flyers on windshields prior to snow season, paid TV ads, utility bill inserts
- Year-round parking bans
- Using loudspeakers to inform citizens of SE tagging and towing
- Going door-to-door to ask citizens to move vehicles

FIGURE 8 - BEST PRACTICES SURVEY
DEMOGRAPHIC AND SERVICE DEMAND FACTORS

		Population	Square Miles	Population Density/sq. mile	Total Centerline Miles	Total Lane Miles	Annual Snowfall (inches)	Utilize SE Procedures?	SE threshold in inches	Average # of SE's per year
1	Bloomington MN	85,172	36	2,366	340	2,016	50	Yes	Other	10
2	Buffalo, NY	292,624	41	7,137	700	pending	96	Yes (note 2)	12-16"	1
3	Denver, CO	554,636	153	3,625	1,767	4,417	60	Yes	6"	2 or less
4	Duluth	86,918	68	1,278	502	NA	78	No (note 1)	NA	NA
5	Edina	47,425	16	3,021	220	440	50	Yes	3"	?
6	Edmonton, AB	648,284	270	2,401	2,770	7,494	54	Yes	6" in 24 hrs	<1
7	Greeley, CO	76,930	30	2,573	320	1,299	36	Yes	6"	only 2 in eleven years
8	Madison, WI	208,054	69	3,028	700	2,000	45	Yes	3"	5
9	Mankato	32,427	12	2,795	355	158	31	Yes	4"	5
10	Milwaukee, WI	596,974	96	6,212	1,443	7,081	48	Yes	4"	4 general plowings per year, not all SE
11	Minneapolis	382,618	58	6,597	986	2,538	50	Yes	4"	3.4
12	Rochester, MN	85,806	40	2,167	370	N/A	50	Yes	6"	0
13	Rochester, NY	219,773	36	6,139	537	N/A	92	Yes	6"	1
14	St. Cloud	46,734	15	3,223	323	733	44	Yes	3"	none to date, but is now w/in an ordinance
15	St. Paul	287,151	53	5,438	874	NA	50	Yes	3"	6
16	Toronto, ON	2,529,300	244	10,366	3,319	7,996	53	Yes	3" (note 3)	one every 5 -10 years
17	Winnipeg, MB	631,700	178	3,549	1,698	4,225	45	Yes	3"	3

Note 1: Duluth plows snow within the parameters of its year-round alternate side parking bans; see Table 2a

Note 2: Depends on amount accumulated, forecast, and winds; for Buffalo, a SE typically means greater than 12"-16" and enlisting aid of contracted services

Note 3: although policy is for 8 cm (3.1 inches) accumulation within 8 hours, in practice they "usually wait until 12 inches" has fallen

FIGURE 9 - BEST PRACTICE SURVEY

OVERVIEW - SNOW EMERGENCY PROCEDURES AND SERVICE LEVELS

		Timeframe for SE procedures	Basic SE Procedures	Basic Parking Restrictions	Uniform citywide application?	If not, how does it vary?
		Q7	*Q6*	*Q6b*	*Q8*	*Q8a*
1	Bloomington, MN	12 hrs	Plow priority routes first, then residential; begin plowing 3 am.	Total parking ban after 3" accumulation for 48 hours or until street is plowed curb-to-curb.	Yes	NA
2	Buffalo, NY	Varies w/ amt; about "2 days" for a 12" snowfall	Phase II conditions constitute a SE (high accumulation, low temps, high winds); this invokes the use of OT as well as private contracted crews/equipment and the use of temporary offstreet parking options	No parking on bus routes from 1 AM to 9 AM from Nov. 1 to April 1. We have the authority to institute an every other day alternative parking plan in an emergency but we have never used it. We feel that it might be confusing.	No	Less restrictive in residential areas
3	Denver, CO	varies - no set timeframe	Uses a 4-phase program: Phase I: focus on arterials; Phase II: add plowing of residential streets and possible parking restrictions; Phase III: add equipment via con-tractors; Phase IV: clean-up and removal	Parking restrictions may be declared after 6" of snow; these restrictions prohibit parking on selected snow routes as marked by signs	Yes	NA
4	Duluth	36 hours	No formal SE procedure; we plow arterials first, then residential, then alleys, cul-de-sacs, and sidewalks	downtown: (2am - 6 am nightly) and residential areas (even/odd bans every other week); both bans are year-round	Yes*	*as described, except for one-way streets
5	Edina	8 hrs	plow main (red) routes first, then residential, then cul-de-sacs/alleys	no parking on City streets November 1 to March 31 when 1½" of snow falls until street plowed curb to curb	Yes	NA
6	Edmonton, Alberta	24 hrs	A public announcement declares a Snow Route Parking Ban. Vehicles remaining on the route can be tagged and towed. The ban is declared in 72 hour increments.	Complete "No Parking" entire route 24 hours a day in 72 hour increments.	Yes	NA

7	Greeley, CO	12 hrs	The Director of PW normally declares a SE if conditions are such that normal operations are not able to keep the streets clear. When a SE is declared a No Parking ban goes into effect. Local radio, newspaper and TV are notified to get the information to the citizens.	When the no parking ban goes in effect both sides of the street are restricted 24 hours a day until the snow is removed. If cars are not moved from posted snow routes they will be towed to the off street and receive a $50 ticket.	Yes	NA
8	Madison, WI	2 days	We use a SE for only one section of the city: our CBD on an isthmus between two large lakes (about 3 miles by 1 mile). Outside of this area, all streets are subject to an alternate side parking ordinance that is enforced Nov 15 to Mar 15. This same alternate prkg ban is used in the SE Zone (CBD) for 2 nights following a declaration of a SE.	The seasonal (Nov 15-Mar15) ban is as follows: vehicles must be parked on the odd side on odd-numbered days, and even side on even-numbered days from 1 -7 am. The area within the SE Zone is exempt from this ban except during SE's.	No	See answers to procedures and parking ban
9	Mankato	24 hrs	When a snow emergency is declared parking is not allowed on any street until that street is plowed curb to curb. We attempt to give at least 4 hrs. advanced notice of when no parking is in effect	Our goal is to have the driving lanes of all streets plowed within 12 hrs. and all streets plowed curb to curb within 24 hrs. This schedule is adjusted if it keeps snowing. When cars are towed, plowing equipment is on the scene to plow as the vehicles are moved. As each block is plowed curb to curb, parking is allowed on that block, with the SE still in effect.	Yes	however, 99% of the problem occurs in 10% of the city, but all parts of the city are treated as equal as possible.
10	Milwaukee, WI	12 to 18 hrs	Alert media and Police. Information on city cable TV station.	Alternate monthly parking; alternate one side; permanent one side; monthly alternating one side; no parking after 2 inches of snow.	No	Each neighborhood has parking regulations to best serve the need of that area.

11	Minneapolis	36 hrs	Three 12-hour phases. Major arterials completed in first 12 hours, residential streets completed in next two 12 hour phases - one side each.	Parking restrictions follow plowing plan: no parking on SE routes during first 12 hours; on odd side of residential streets next 12 hours, and on even side during last 12 hours	Yes	NA
12	Rochester, MN	pending	pending	pending	Yes	NA
13	Rochester, NY	24 hrs	Designated snow routes are posted, the mayor or his designee declares the S.E. The public is notified through various media types. A window is declared; generally 12 to 24 hours.	During S.E. there is no parking on designated snow routes. An S.E. has a start time and an ending time. The S.E. may be extended if necessary.	No	Snow Emergency routes are only on main arterial streets and bus routes.
14	St. Cloud	72 hrs	SE Declaration means towing of any illegally parked cars immediately after they are ticketed. Our policy is 3 inches or more of snowfall will initiate a SE.	Odd/even calendar parking from Nov. 1 to April 1.	No	Some new annexed areas have no on street parking regulations.
15	St. Paul	16-20 hrs	Night phase: SE routes & posted side of N/S residential streets; Day phase: E/W residentials & non-posted side of N/S residentials & cul de sacs	No parking per plow schedule "until streets have been plowed to the curb"; year-round parking restrictions apply to downtown area and selected arterials at night	Yes*	*Except for downtown
16	Toronto, Ontario	72 hours	expressways & main roads first priority; plow side (residential) streets w/in 15-20 hours after end of snowfall; next 24 hours clean-up plowing; sidewalks, bus shelters in 48 hours	on selected major streets, 24 hr a day until snow is removed	No	procedures do not apply to residential streets
17	Winnipeg, Manitoba	5 days	Initiation of parking bans to limit the number of parked vehicles on our City streets. Once it is decided to undertake a major snow cleaning effort, the bans are placed into effect for the duration of the plowing effort.	Parking/stopping is prohibited on all City streets from 12:00 midnight to 6:00 am. This prohibition remains in effect until all plowing is completed. However citizens can park once a street has been plowed and they won't be ticketed	No	Ticketing and towing to impound only applies to arterial streets. On local streets cars are ticketed only.

FIGURE 10 - BEST PRACTICE SURVEY

DETAIL - SNOW EMERGENCY PROCEDURES AND SERVICE LEVELS

		Level of Plowing Services(see key below)				Clear Sidewalks?				Plow alleys?
		Arterials	Residential	Alleys	Other	on City-owned property	on bridges	private, business property	private, residential property	
1	Bloomington, MN	b	c	c		Yes	Yes	Yes	Yes	Yes
2	Buffalo, NY	a	a	c		Yes	Yes	No	No	Some
3	Denver, CO	a	b	NA	Secondary: a	Yes	Yes	No	No	No
4	Duluth	a	b	c		Yes	Yes	No	No	Yes
5	Edina	a	c	c		Yes	Some	No	No	Yes
6	Edmonton, Alberta	a	f	f		Yes	Yes	No	No	Some
7	Greeley, CO	a	e	e	Priority 2 streets: b	Yes	Yes	No	No	Some
8	Madison, WI	b	c	c		Yes	Yes	No	No	Some
9	Mankato	a	a-c	c		Yes	Yes	No	No	Yes
10	Milwaukee, WI	b	b	e		Yes	Yes	No	Some	No
11	Minneapolis	b	c	c		Yes	Yes	Some	No	Yes
12	Rochester, MN	a	b	c		Yes	Yes	Yes	Yes	Yes
13	Rochester, NY	a	c	c	Central Bus district: a	Yes	Yes	Yes	Y	Yes
14	St. Cloud	b	c	d		Yes	Yes	Some	Some	Yes
15	St. Paul	b	c	e	Loop: a	Some	Yes	No	No	Yes
16	Toronto, Ontario	a	f	g	Collector: b	Yes(90%)	Yes	No	No	Yes
17	Winnipeg, Manitoba	a	a	d	Sidewalks: c	Yes	Yes	No	Yes	Yes

a = bare pavement all lanes

b = bare pavement in traveled lanes; snow packed in parking lanes

c = snow packed with sanding applied on hills, curves, intersections

d = snow packed, no further treatment

e = no consistent or specific level of service

f = other, please explain

FIGURE 11 - BEST PRACTICE SURVEY

PARKING RESTRICTION ISSUES

			Parking enforcement methods used				Parking bans used				
		How big a problem are parked cars?	Tags	Tow-Impound	Tow-around block	Other	Temporary, seasonal on selected streets	One side after threshold amt	Overnight	Other	Avg # of tows per SE?
1	Bloomington, MN	no problem	X				No parking bans used				do not tow
2	Buffalo, NY	huge	X	X (note 1)	X		X				200 (note 8)
3	Denver, CO	somewhat			X					X (note 3)	NA
4	Duluth	serious	X	X			Year-round parking bans; see Table 2a				10
5	Edina	somewhat	X						X		1
6	Edmonton, Alberta	somewhat	X		X		X			see note 3	NA
7	Greeley, CO	somewhat			X						
8	Madison, WI	serious	X				X			see note 4	
9	Mankato	huge	X	X		see note 2		X		see note 5	100
10	Milwaukee, WI	serious	X	X			X	X		see note 6	175/night
11	Minneapolis	serious	X	X				X			1,700
12	Rochester, MN	mixed	X	X			X				3
13	Rochester, NY	somewhat	X	X	X					see note 7	N/A
14	St. Cloud	serious	X	X			X				6 to 12
15	St. Paul	serious	X	X				X	X	see note 8	1200-1400
16	Toronto, Ontario	somewhat	X	X	X				X	selected areas	100
17	Winnipeg, Manitoba	serious	X	X	X		X			see note 9	250

Note 1: tow & impound done as last resort (about 200 per SE); the norm is 'mini-tows" (tow around the corner) which are not counted in this figure

Note 2: traffic enforcement officer, plow, and tow trucks all on scene. The TEO tells tow driver to move vehicles, actual tickets written at impound lot as vehicles are brought in.

Note 3: temporary bans during snow removal

Note 4: some streets have parking ban on one side only, some have no parking all or part of the time

Note 5: when parking is plowed cars move to no parking side until the other side is plowed - then move back

Note 6: opposite side parking

Note 7: posted alternated side parking restrictions throughout the year.

Note 8: Loop: n/s Mon, Wed, Fri - e/w Tues, Thur, Sat. Major Primaries: 2 am-7am some every night some other frequencies

Note 9: temporary no parking signs used in isolated areas where work required - short term only

FIGURE 12 - BEST PRACTICE SURVEY
"EFFECTIVE" TECHNIQUES and "MOST DIFFICULT ISSUES"

		techniques to improve compliance with parking restrictions	techniques to deal with vehicles parked in violation of parking restrictions	"most difficult" issues
1	Bloomington, MN	not a huge problem for us	not a huge problem for us	Public perception: "sand too much","don't sand enough" ,"why are you plowing - not enough snow", "why aren't you plowing"
2	Buffalo, NY	personal contact with residents: loudspeakers on Parking Violation Bureau trucks (which do ticketing), knocking on doors	same	parked cars, equipment breakdowns
3	Denver, CO	Media	none	equipment breakdowns
4	Duluth	mailers, media information	tag and tow	parked cars
5	Edina	plow drivers alert our PD of snow birds	tag	
6	Edmonton, Alberta	Temporary signage (indicating 3 day period for pick up) placed in windrow prior to removal; labor intensive but customer friendly	tow around the corner	Parking restrictions. Residential service levels.
7	Greeley, CO	24 hours after the street was plowed, we place a courtesy letter asking them not to park on the street when there is a snow fall	The City has only declared two (2) SE's since inception. We have not had to tow any vehicles, however, we have put in our program to tow and fine ($50).	
8	Madison, WI	We hire seasonal parking monitors to enforce the alternate side parking ordinance 7 nights a week during season.	If vehicles are not moved for a period of time after a snow storm parked cars are referred to Police parking enforcement for towing as abandoned vehicles or illegally stored vehicles	Our service varies from the service level of surrounding suburbs, traffic, demanding customers
9	Mankato	We have tried everything that could be imagined - the system now used works the best. When a snow emergency is called no parking is allowed on any street, until that street has been plowed curb to curb. No exceptions.	As previously described we have tried everything - no parking is the only one that works if you truly want to solve the problem.	No matter what you do, some people will not hear that a snow emergency has been called. There are those that think a parking spot is a God given right [even when it snows.]

10	Milwaukee, WI	our most effective tool was a press release to broadcast media with a contact phone number. From this I did 5 informative television spots regarding emer. parking regulations.	Tow to impound lot	After public safety is guaranteed, weighing the additional costs vs. public convenience
11	Minneapolis	A variety of PR - no other physical means of enforcement	Tow to impound lot	public compliance with the rules - especially on weekends
12	Rochester, MN	no response	no response	Parking problems with large number of transients at Mayo; most transients would have no idea that a snow emergency was in effect
13	Rochester, NY	short parking restriction windows on specific days of the week, approx. 6 areas	ticketing and towing cars that are obstructing or have been snowbound for a number of days	On street parking, snowbound cars, plowing in driveways, contractors pushing snow into the street
14	St. Cloud	early season warning tickets, then consistent ticketing is the best training tool. Just starting to enforce regulations as described in earlier comment in survey	tow and impound when a snow emergency is declared	Whiners, complaints and lack of understanding from the public what it takes to clean up a city after a snowfall. Difficult to get PD involved in enforcement but that is moving forward
15	St. Paul	completely plow them in, email notices	tow to impound lot to discourage future non-compliance	clueless customers - the notice of plowing to come is everywhere when 3" or more of snow has fallen. Also inadequate number of drivers.
16	Toronto, Ontario	special signs on snow emergency routes, also media warnings	tow around the corner	very high public expectations!!
17	Winnipeg, Manitoba	education programs that are covered in later questions	Most effective technique is publicity resulting from towing and impound	Lack of accurate forecasting information, availability of private equipment, raised public expectations, limited funding

FIGURE 13 - BEST PRACTICE SURVEY

COMMUNICATION METHODS

Q29: how do you communicate to public?

		press releases to news-paper	community papers	radio/TV	cable TV	post notices	telephone	street signs	web site	email	flyers	other	other- describe
1	Bloomington, MN	X	X	X	X		X	X			X		
2	Buffalo, NY		X	X	X	X			X				
3	Denver, CO			X			X	X	X			X	City Council
4	Duluth	X	X	X				X			X	X	utility bill inserts
5	Edina	X	X		X				X				
6	Edmonton, Alberta	X		X			X		X			X	Pamphlets & maps
7	Greeley, CO	X	X	X	X		X	X	X		X	X	door hangers on snow route homes
8	Madison, WI	X	X	X	X		X		X	X		X	flyers on windshields in fall
9	Mankato	X		X	X		X		X		X		
10	Milwaukee, WI	X		X	X			X	X				
11	Minneapolis	X		X	X		X		X	X	X		
12	Rochester, MN	X		X	X			X					
13	Rochester, NY	X	X	X				X	X		X		
14	St. Cloud	X	X	X	X				X			X	see note 1
15	St. Paul	X	X	X	X	X	X	X	X	X			
16	Toronto, Ontario	X	X	X	X	X	X	X	X			X	media interviews
17	Winnipeg, Manitoba	X	X	X	X	X	X	X	X	X	X	X	ads on TV

Note 1: Ticketed cars during non-emergency snows got a flier stating that if this was an emergency, the vehicle would have been towed.

FIGURE 14 - BEST PRACTICE SURVEY
PERSONNEL AND EQUIPMENT

		Q13 Personnel Assigned to SEs					Q15: Use Solid Waste:		Q. 19 # & Type of Equipment (owned and contracted)					
		Mgr/ Supv	Drivers/ Operators		Support (mechanics)		Personnel	Equipment	Single axle	Tandem axle	Moter Graders	Front End Loaders	Solid Waste Vehicle	Other
			FT	PT	FT	PT								
1	Bloomington MN	4	46		10		No	No	20	12	0	5	0	9
2	Buffalo, NY	11	45		9		Yes	No	10	55	4	220		505
3	Denver, CO	23	120	10 - 15	15 - 20		No	No	0	78	11	7	0	0
4	Duluth	4	66	4	5		No	No	27	3	20	5	0	0
5	Edina	2	30		5		No	No	15	7	1	5	0	3
6	Edmonton, AB	35	300				No	No	12	70	185	5	0	24
7	Greeley, CO	4	35		4		No	No	7	4	2	0	0	6
8	Madison, WI	15	90		12		Yes	Yes	63	14	44	35	0	0
9	Mankato	1 per shift	12 per shift	none	6 during reg hrs, 1 -2 during off hrs	none	No	No	10	6	1	4	0	2
10	Milwaukee, WI	100	392		138		Yes	Yes	60	30	0	69	181	0
11	Minneapolis	26	180	10	80		No	No	10	31	18	17	0	33
12	Rochester, MN	1	44		4		No	No	16	8	6	2	0	4
13	Rochester, NY	12	69	9	28	1	Yes	Yes	10	18	1	5	30	58
14	St. Cloud	2	27		3		Yes	No	4	14	4	2	0	2
15	St. Paul	12 per shift	65 per shift	25 per shift			No	No	40	16	18	5	0	0
16	Toronto, Ontario	100	500	1,200	100		No	No	70	255	250	100	0	503
17	Winnipeg, MB	10	180	500	30	50	No	No	75	50	72	90	0	30

Description of an Alternative 2 Phase (24-Hour) SE Plan

A 2 Phase SE plan would consist of the following schedule:

"Night Plowing" - 9 p.m. to 8 a.m. – Includes the current SE routes, and one-side of the east-west streets (or added miles from Phase 2, and Phase 3 – both sides?)

"Day Plowing" - 9 a.m. to 8 p.m. – all remaining non-night plow routes

This plan would remove the last two phases of the current 3 Phase SE plan which are the parking change-over and the Phase 3 plowing. The streets that are plowed during Phase 3 would be distributed into the Night Plowing and Day Plowing phase.

The term "Snow Emergency Route" could be replaced with the terms Night Route and Day Route. The Night plowing could be done first, or the Day plowing could be done first. A summary of the general activities to be conducted during a 2 Phase SE are shown in Figure 15. The impacts of a 2 Phase plan on the activities and costs of snow emergencies are summarized below.

On Street Signage

Signage was a preferred source of SE information for 73% of the respondents to the Citizens Survey. New on-street signage could be placed on every block identifying it as a "Night Route" or "Day Route", or only placed on the Night Routes (the majority of the current SE routes would be re-designated as Night Routes).

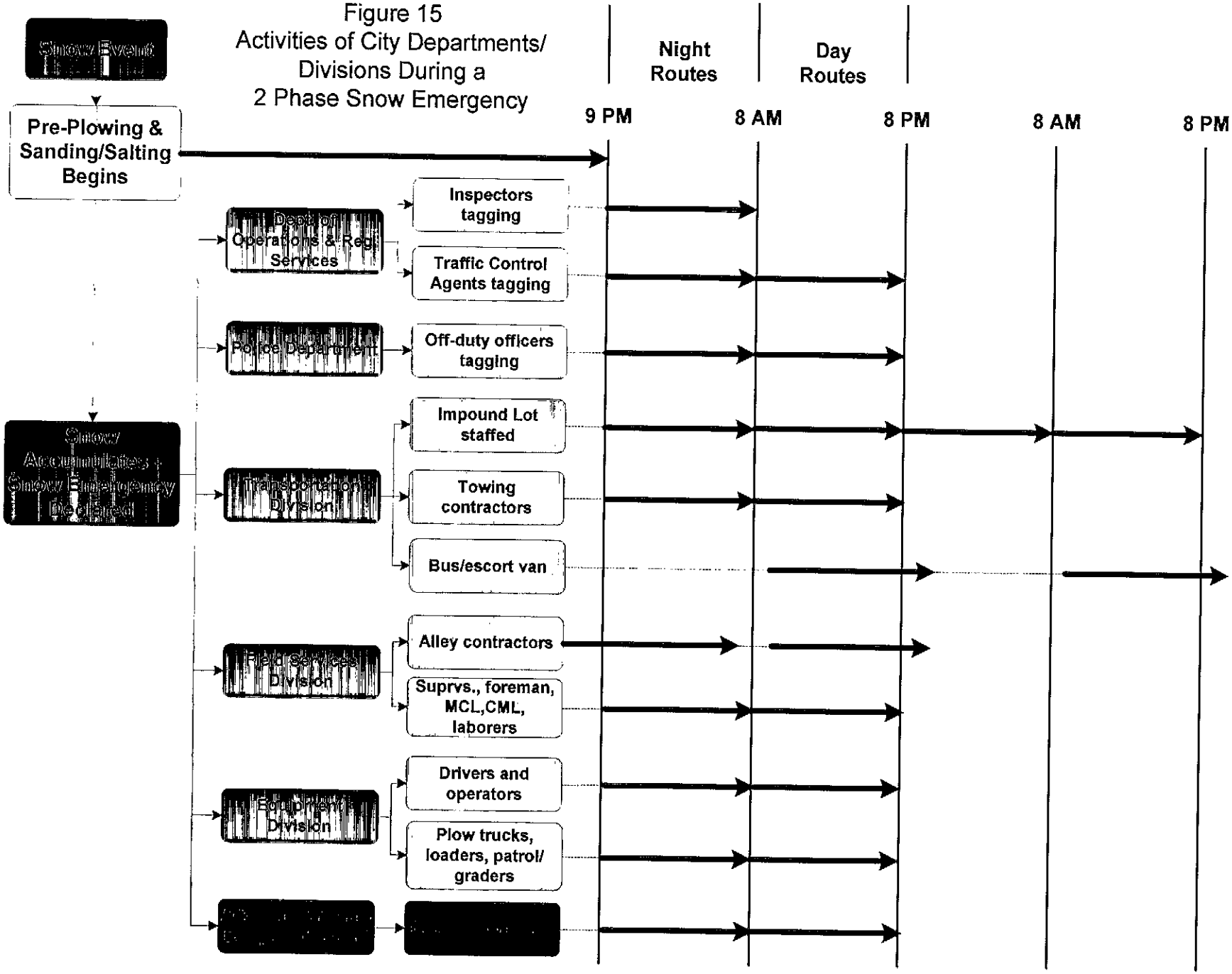
The Transportation Division has estimated it would require six months to manufacture, purchase, and install a new sign on every block in the City at an estimated cost of:

Manufacture 16,000 signs	$ 279,153
Purchase 8,000 signs	$ 140,000
Install 24,000 signs	$ 973,183
Total	$ 1,392,336

An alternative to re-signing every block is to re-sign only the Night routes. The Day routes would then be designated as non-signed routes. The cost is estimated to be $821,478 (the preliminary estimate of miles of roadway to be plowed during the night routes is 59% of all CL miles, therefore: 1,392,336 x .59 = 821,478)

Another alternative is to maintain the SE route label for the Night routes and use the existing on-street SE route signage supplemented with new signage for added lane miles. The costs for this alternative are estimated at $300,000. SE routes could be plowed during the Night plowing, or during the Day plowing if there is a desire to alternate which routes are plowed first.

Figure 15
Activities of City Departments/
Divisions During a
2 Phase Snow Emergency



Staffing for Miles to be Plowed

The number of lane miles to be plowed during the Night Plow routes would increase from 743 in the current Phase 1, to an estimated 1,497 in a 2 Phase SE plan. The lane miles of the Day Plow routes would be nearly identical to the current Phase 2 routes. The lane miles plowed in the current 3 Phase plan and the number of lane miles to be plowed in a 2 Phase plan are as follows:

Lane Miles to be Plowed
Current 3 Phase Plan

	Phase 1	Phase 2	Phase 3	Total
Lane miles	743	952	842	2,537

Lane Miles to be Plowed
2 Phase Plan

	Night Plow Route	Day Plow Routes	Total
Lane miles	1,497	1,040	2,537

The increase in lane miles during Night Plowing is a 100% increase over the existing lane miles of the current Phase 1 plowing.

Based on the plow rates for Phase 1, Phase 2,and Phase 3 of the current plan, it is estimated that up to 75 additional drivers and operators would be required to plow 100% more lane miles in the Night Plow routes of a 2 Phase plan using the same equipment, techniques, and routes.

A possible source of additional drivers may be the Solid Waste and Recycling Division which includes 70 drivers with commercial driver licenses (CDL's). These drivers could be used during the Night plow routes of a 2 Phase plan to supplement the existing plowing staff. This Division also maintains a fleet of 25 Solid Waste "packers" that could be retrofitted with snow plowing equipment. It is anticipated that the use of added plowing staff, the added "packer plows", along with redefined routes, and the use of additional existing equipment, and the use of techniques such as using wing plows, the plowing of the added lane miles can be accomplished.

Two estimates to retrofit the packers have been acquired and are as follows:

	Bid/packer	No. of packers	total
Crysteel	$17,150	25 packers	$428,750
McQueen	$15,150	25 packers	$378,750

One-time Costs for Signage and Retrofitting Equipment for a 2 Phase SE Plan

The two significant one-time costs for converting to a 2 Phase plan are as follows:

	New Signage on Night Routes only	New Signage on all Night and Day routes
New Signage	$ 821,478	$1,392,336
Retrofitting Solid Waste and Recycling Packers with Snowplowing Equipment	$ 428,750	$ 428,750
Total	$ 1,250,228	$ 1,821,086

On-going Costs for Labor/Equipment/Material of a 2 Phase SE

The estimated cost for on-going activities during a 2 Phase snow emergency is $477,000. This includes a base cost for labor and materials of $251,000 that would be expended for snow and ice control during a 2 Phase period without a snow emergency being declared, and includes additional incremental costs for labor, equipment and materials (such as overtime, and equipment contracts) of $226,000 expended as the direct result of a snow emergency being declared. A summary of the costs is shown below.

	Hours	Labor Expenses	Equip/ Material Expenses	Total Base Costs	Total Incremental Costs	Total Costs
Transportation						
Base	408	$ 8,700	$ 0	$ 8,700		
Incremental	297	11,300	40,300		$ 51,600	
Total	705	20,000	40,300			$ 60,300
Field Services						
Base	816	23,000	152,000	175,000		
Incremental	408	20,100	0		20,100	
Total	1,224	43,100	152,000			195,100
Equipment Services						
Base	1,152	49,300	17,700	67,000		
Incremental	576	43,100	19,300		62,400	
Total	1,728	92,300	37,000			129,300
Solid Waste						
Base	0	0	0	0		
Incremental	360	16,200	9,000		25,200	
Total	360	16,200	9,000			25,200
Regulatory Services						
Base	0	0	0	0		
Incremental	637	24,000	1,200		25,200	
Total	637	24,000	1,200			25,200
Police						
Base	NA	0	0	0		
Incremental	NA	40,000	1,600		41,600	
Total	NA	40,000	1,600			41,600
			Total Base Costs	**.....$250,700**		
			Total Incremental Costs		**.....$226,100**	
			Total Costs			**.....$476,700**

Communications

It is anticipated that the 2 Phase plan would be a simpler message to communicate than the current plan. The difficulty in communicating the complexity of the current 3 Phase plan was identified as a significant issue by public officials and citizens. However, because it is a "new" plan, a new message would need to be created to help the citizens transition from the current plan to a new 2 Phase plan.

The Public Affairs Office would need to work closely with the PW Divisions and the DORS TCA, and the Police Dept. to create a comprehensive, effective communications plan.

Many additional communication techniques were recommended by public officials and citizens and may be incorporated into improved communications such as:

- Email notification for organization-wide distribution to universities, employers, multi-unit housing, hospitals, churches, ethnic organizations, neighborhood organizations.
- Block club leaders notifying members through emails, phone messaging, or going door to door to inform citizens.
- Re-phrasing of communications (including on-street signage) to be more effective; such as stating where to park or not to park, rather than simply "Snow Emergency".

Parking Restriction Issues

The 2 Phase plan would increase the miles of roadway with parking restrictions during a 12 hour phase. The current 3 Phase system restricts parking on one-third of all streets during each 12 hour phase of the SE and allows parking on the other two-thirds. The 2 Phase plan will restrict parking on approximately half of the streets during each 12 hour phase and reduce the availability of on-street parking.

To compensate for the loss of on-street parking, the SE parking restriction could be removed on a street when the street is fully plowed curb-to-curb. This essentially creates a "floating parking restriction" that is in force prior to plowing, during plowing, and then terminates after the plows complete a street.

The success of this floating parking restriction is dependent upon how a street is defined as completed such as: "fully plowed curb-to-curb". This definition, and who makes the determination of when a street meets the definition, would need to be communicated to the citizens, plow drivers, and enforcement staff.

Enforcement – Tagging

It is anticipated that additional enforcement – tagging capacity will be needed for a 2 Phase plan to maintain the current service level of curb-to-curb plowing that exits with the current plan.

The 2 Phase plan would more than double the miles of roadway with parking restrictions to be enforced during the first 12 hour Night Plowing phase than Phase 1 of the current plan. The miles of roadway with parking restrictions during the Day Plowing phase would remain similar to Phase 2 of the current plan and therefore it is estimated the number of tags on the Day plow routes would be would be similar to the current Phase 2 tags.

Currently, Phase 1 tagging is done by off-duty Police officers, and DORS inspectors. The schedule for these staff, and the number of these staff required on Phase 1 would not change. They would continue to tag during the Night Plowing.

The 32 traffic Control Agents that currently tag on Phase 2 and on Phase 3 would be divided between the Night Routes and the Day Routes. Up to 25 additional off-duty officers would be utilized on the Day Route to compensate for the redistribution of some TCA staff to the Night routes.

Based on the average tagging rates for the miles of roadway with parking restrictions enforced by each of these groups of staff, the average number of tags written during the current 3 Phase plan and an estimate for the number of tags to be written during a 2 Phase plan are as follows:

Average Number of Tags
Current 3 Phase Plan

	Phase 1	Phase 2	Phase 3	Total Tags
DORS inspectors	396			
Off-duty officers	2,025			
Traffic Control Agents		4,320	2,848	
Total	2,421	4,320	2,848	9,589

Estimated Number of Tags
2 Phase Plan

	Night Plow Routes	Day Plow Routes	Total Tags
DORS inspectors	396		
Off-duty officers	2,025	2,025	
Traffic control agents	2,080	2,080	
Total	4,483	4,105	8,588

Enforcement – Towing

It is anticipated that additional enforcement – towing capacity on the Night Plow routes will be needed for a 2 Phase plan to maintain the current service level of curb-to-curb plowing that exits with the current plan.

As the 2 Phase plan would more than double the miles of roadway with parking restrictions to be enforced during the first 12 hour Night Plowing, it is estimated that the number of tags will nearly double.

Currently, the 67 tow trucks available on Phase 1 tow an average of 32% of all tagged vehicles (this is 9.6 tows per tow truck per shift and this tow rate is significantly affected by the round trip travel time to and from the Impound lot). To maintain a towing rate of 32% of tagged vehicles (at 9.6 tows per truck) during the Night Plow phase of a 2 Phase plan, a fleet of 179 trucks would be required. A fleet of 179 tow trucks could tow an estimated 2,173 vehicles during a 2 Phase plan. This would be a 33% increase in the number of towed vehicles during the current 3 Phase snow emergency. The capacity of the Impound Lot is often exceeded during the current 3 Phase snow emergencies and a 33% increase in the number of towed vehicles would significantly exceed the storage capacity of the Impound Lot.

If the current fleet of 67 trucks is utilized for a Night Plow route of a 2 Phase plan it is estimated 14% of all tagged vehicles on the Night Plow routes could be towed.

While a large number of tow trucks may exist within the Twin Cities area, Public Works staff and a representative of the Minnesota Professional Towing Association indicate it currently is difficult for towing companies to find a large number of drivers that are willing to work the long hours in the adverse conditions that occur during a SE. The drivers of these trucks typically put in a +9 hour shift on Phase 1, then rest for a few hours, and then return for another shift on Phase 2.

Additional towing capacity may be acquired, however it is unlikely that up to 179 trucks and drivers could be contracted. The current contracts with the towing vendors include a provision that states the City may require more towing capacity and the City reserves the right to arrange for towing services from additional companies other than the existing contractor for each towing zone. The current contractors would be requested to supply additional trucks, and additional bids would be pursued to increase capacity to between 67 and 179 trucks.

The miles of roadway with parking restrictions during the Day Plowing phase would remain similar to Phase 2 of the current plan and the towing capacity would remain similar to the existing 3 Phase plan.

Enforcement – Violation Fine

It is anticipated that an increase in the fine for a SE parking violation would increase compliance of parking restrictions in a 2 Phase plan. The current schedule of fines related to SE activities are $20 for SE parking violation, $125 Impound Lot release fee, and $15/day Impound Lot storage fee.

The City of Minneapolis receives 80% of the SE parking violation and Hennepin County receives 20%. The Hennepin County Violations Bureau administers the fine payment process.

The SE parking violation fee is mandated by Minnesota Statue. The release fee and storage fee are intended to equal the expenses associated with towing the violating vehicles and a portion of the cost of operating the Impound Lot.

The Hennepin County Violations Bureau has stated that raising the fee to $30 would make the fee consistent with typical parking violations and with the University of Minnesota. Additional recommendations from City staff have included raising the SE parking violation fee to $50 to $75. The revenue from increased fees is as follows:

Average Violation Revenue Current 3 Phase Plan			
Total number of tags	**Total revenue @ $20/tag** (less 15% no pays)	**City of Minneapolis @ 80%**	**Hennepin County @ 20%**
9,589	$163,013	$130,410	$32,603

Estimated Violation Revenue 2 Phase Plan			
Total number of tags	**Total revenue @ $75/tag** (less 15% no pays	**City of Minneapolis @ 80%**	**Hennepin County @ 20%**
8,588	$547,485	$437,988	$109,497

Transition Schedule

A significant amount of activity will need to occur to transition from the current 3 Phase Plan to a 2 Phase Plan. A preliminary transition schedule is shown in Figure 16.

Figure 16
Preliminary Transition Schedule for a 2 Phase Plan